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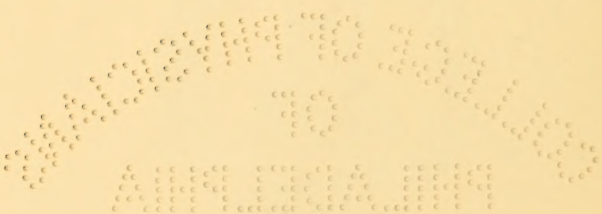

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1894.—Powell, Seneca D., M.D. Professor of Surgery in New York Post-Graduate Medical School and Hospital; Visiting Surgeon to St. Mark's Hospital, New York. 12 West 40th Street, New York, N. Y.

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1890.—Reed, Charles Alfred Lee, M.D. Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress 1893; Honorary Member of the Medical Society of the State of New York. Cincinnati, Ohio.

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1893.—Saunders, Bacon, M.D. Fort Worth, Texas.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Texas.

1893.—Senn, Nicholas, M.D., Ph.D., LL.D. Professor of Practice of Surgery and Clinical Surgery, Rush Medical College; Professor of the Practice of Surgery, Chicago Polyclinic; Attending Surgeon, Presbyterian Hospital; Surgeon to St. Joseph's Hospital; ex-President of the American Surgical Association. Chicago, Ill.

Founder.—Shivers, Offa Lundsford, M.D. Councillor of the Alabama Medical Association. Marion, Ala.

1892.—Simons T. Grange, M.D. Ex-President of the South Carolina Medical Association; Member of the State Board of Health of South Carolina; formerly President of the Charleston County Medical Society. Charleston, S. C.

1893.—Simons, Manning, M.D. Professor of Clinical Surgery in the Medical College of the State of South Carolina; Surgeon to St. Francis' Infirmary; Surgeon to City Hospital. *Vice-President*, 1895. Charleston, S. C.

1894.—Smith, Reginald K., M.D. United States Navy.

* Deceased.

Founder.—Souchon, Edmond, M.D. Professor of Anatomy and Clinical Surgery, Medical Department of Tulane University; Member of American Surgical Association. New Orleans, La.

Founder.—Stone, Isaac Scott, M.D. Gynecologist to Columbia Hospital; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; formerly Member of the Medical Examining Board of Virginia. Washington, D. C.

1894.—Talley, D. F., M.D. Ex-President Jefferson County Medical Society; Professor of Materia Medica and Lecturer on Surgery, Birmingham Medical College. Birmingham, Ala.

Founder.—Taylor, B. W., M.D. Ex-President of the State Medical Association of South Carolina; ex-President of the Columbia Medical Society. Columbia, S. C.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery, University College of Medicine; Surgeon to Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. Richmond, Va.

1898.—Taylor, William Wood, A.B., M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 343 Adams Street, Memphis, Tenn.

1895.—Thompson, F. D., M.D. Fellow American Association of Obstetricians and Gynecologists. Fort Worth, Texas.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1891.—Tiffany, Louis McLane, M.D. Professor of Surgery in the University of Maryland; Fellow of the American Surgical Association. *President*, 1895. Baltimore, Md.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. Richmond, Va.

1891.—Trippe, Richard Jefferson, M.D. Ex-President of the Chattanooga Medical Society. Chattanooga, Tenn.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Missouri Medical College. St. Louis, Mo.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; Fellow of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists. Albany, N. Y.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist, Evans-

ville City Hospital; ex-President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. Evansville, Ind.

1898.—Watkins, Isaac Lafayette, M.D. President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1895.—Weist, Jacob Rowland, A.M., M.D. Surgeon to St. Stephen's Hospital; Secretary American Surgical Association. Richmond, Ind.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta Medical College. Atlanta, Ga.

1897.—Williams, R. F., M.D. Professor of Materia Medica and Therapeutics and Lecturer on Orthopedic Surgery, Medical College of Virginia; Orthopedist to the Old Dominion Hospital and City Free Dispensary. Richmond, Va.

Founder.—Wilson, J. T., M.D. Ex-President of the North TexasMedical Association; President Texas Medical Association; Superintendent of the State Hospital for the Insane. *Vice-President,* 1891. Terrell, Texas.

1891.—Wyeth, John Allen, M.D. Professor of Surgery New York Polyclinic; Consulting Surgeon to St. Elizabeth's Hospital; Visiting Surgeon to Mt. Sinai Hospital and Polyclinic Hospital; Honorary Member of the Texas State Medical Association; ex-President of the New York Pathological Society. New York, N. Y.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be The Southern Surgical and Gynecological Association.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

Section 1. Any reputable physician, who practises surgery or gynecology, and who is vouched for by two members of the Association, and recommended by the Council, shall be eligible to membership in this body.

Sec. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

Section 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot, without nomination.

Sec. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for re-election at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association by the seal of the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and be chairman of the Publishing Committee.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint a Committee of Finance, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same at the next session of the Association.

ARTICLE VII.

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

Any member who for three consecutive years fails to attend the meetings shall be dropped from the roll of membership.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the second Tuesday of November at 10 A.M., at such place as may be designated by the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive, at each annual Session, a draft from the President, drawn on the Treasurer, for the sum of $100 for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify by circular letters the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of all essays shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the circular letter to the members.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so

that subsequently one member of the Council shall be elected annually to serve five years. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The following are the standing committees of the Association to be filled by the President and to report at the next annual meeting subsequent to their appointment, viz.: Committee of Arrangements and Committee of Publication. The Committee of Publication shall consist of three members, one of whom, the Secretary of the Association, shall also be the chairman of the said committee. The Committee of Arrangements shall consist of five members.

ARTICLE XII.

The Committee of Publication shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

Every physician making application for membership shall present with his application a paper on some surgical or gynecological subject.

ARTICLE XV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XVI.

No paper read before the Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Committee of Publication.

ARTICLE XVII.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

ELEVENTH ANNUAL MEETING

OF

THE SOUTHERN

SURGICAL AND GYNECOLOGICAL

ASSOCIATION,

HELD AT THE

GAYOSO HOTEL,

Memphis, Tenn.,

DECEMBER 6, 7, AND 8, 1898.

ELEVENTH ANNUAL MEETING.

The following-named members were present.

BALDRIDGE, F. E.	Huntsville, Ala.
BAXTER, GEORGE A.	Chattanooga, Tenn.
BOVÉE, J. W.	Washington, D C.
BROWN, GEORGE S.	Birmingham, Ala.
CARTLEDGE, A. M.	Louisville, Ky.
CROFFORD, T. J.	Memphis, Tenn.
DAVIS, W. E. B.	Birmingham, Ala.
DOUGLAS, RICHARD	Nashville, Tenn.
ELKIN, W. S.	Atlanta, Ga.
GRANT, HORACE H.	Louisville, Ky.
HAGGARD, W. D., Jr.	Nashville, Tenn.
HARDON, VIRGIL O.	Atlanta, Ga.
JOHNSON, JOSEPH TABER	Washington, D. C.
KELLY, HOWARD A.	Baltimore, Md.
LEWIS, E. S.	New Orleans, La.
McMURTRY, L. S.	Louisville, Ky.
McRAE, F. W.	Atlanta, Ga.
MAURY, R. B.	Memphis, Tenn.
MILLER, C. JEFF.	New Orleans, La.
MURFREE, J. B.	Murfreesboro, Tenn.
NOBLE, GEORGE H.	Atlanta, Ga.
PARHAM, F. W.	New Orleans, La.
PARKER, W. E.	New Orleans, La.
ROBINSON, W. L.	Danville, Va.
RODMAN, W. L.	Philadelphia, Pa.
ROGERS, W. B.	Memphis, Tenn.
STONE, ISAAC S.	Washington, D. C.
TAYLOR, W. W.	Memphis, Tenn.
TIFFANY, L. M.	Baltimore, Md.
TOMPKINS, CHRISTOPHER	Richmond, Va.
WESTMORELAND, W. F.	Atlanta, Ga.
WILSON, J. T.	Terrell, Texas.

Letters and messages of regret were received from a number of members who were unable to attend the meeting.

First Day.—*Tuesday, December* 6, 1898.

Morning Session.—The meeting was called to order by the President, Dr. Richard Douglas, of Nashville, Tenn., at 10 A.M.

Prayer was offered by Bishop Gaylor.

The chairman of the Local Committee of Arrangements, Dr. R. B. Maury, then introduced Professor Alexander Erskine, who delivered the following

ADDRESS OF WELCOME.

Mr. President and Gentlemen: Invited and empowered by your Committee of Arrangements to welcome you to Memphis, I do so with much pleasure. As a citizen, I extend the hospitality of our hospitable city. As a member of the Memphis Medical Society, I offer you greetings which are courteous and kind. As a representative of the local profession, I grasp your hands with fraternal cordiality. It gives us all pleasure to welcome you. Memphis possesses a warm heart and a very refined hospitality. She is sincere and cordial. Personal introductions will speedily follow, naturally enhancing our mutual esteem. Welcome to our city. We anticipate much pleasure in hearing your discussions. They cannot but be profitable and pleasing. Progressive physicians always find their highest enjoyment in scientific debates. Before these the graces and beauties of literature often pale.

To this Association the ablest intellects of the South annually gather. Those of us who come to listen enjoy them the more because of our confidence in the accuracy and profundity of your knowledge. To know that you understand the breadth and scope of the subjects which you present is to an auditor a very gratifying assurance.

A learned divine of most acute perception and sound judgment, who attended closely at nearly all the sessions of the Public Health Association, which met in Memphis a few years ago, said to me that it was the ablest body which had ever met in Memphis. There is no just reason why this Association should not stand pre-eminent. Why, indeed, should not proud America, in her daring reach, eclipse the world in the profundity of her scientific researches? In war she has suddenly

startled the gaze of all lands by her energy and power—why not in the arts of peace? And what is more sublime than all the beautifully beneficent scientific results which grow out of and flow from its serene calm?

It was true in the past, and is true now, that many of the ablest leaders in medical pursuits have sprung from the South. Professional literature is rich in their contributions. As authors and practitioners they have attained a just and proud pre-eminence. To admire and exalt these is not to detract from others. Let me select some fine illustrations confirmatory of my assertion.

In the generation which has passed there were Stone, of New Orleans; Nott and Mastin, of Mobile; Marion Sims, of Montgomery; Eve and Briggs, of Nashville; Geddings, of Charleston; McDowell, Gross, and Yandell, of Kentucky, and Dr. Charles Pope, of St. Louis. "There were giants in those days."

Pardon a personal allusion. Dr. Charles Pope was born in Huntsville, Alabama, my native place, and grew to manhood when I was a little lad. He studied medicine in my father's office under the firm of Fearn & Erskine. Such was the custom of those days before medical colleges multiplied. The doctor's shop was the sanctum of professional fledglings and aspiring tyros. He finished his education in Paris, at a time when a trip across the ocean was a marvel. To have accomplished such was at once to establish the prestige of unusual attainments and a finished education. Such was his reputation at home, the promise of which he afterward so ably sustained, becoming the pioneer in surgery in young and thriving St. Louis.

It afterward became my fortune to study anatomy in the same office and upon the same skull upon which Pope studied, and upon which he so boldly and beautifully carved his name.

Most of these eminent men were born in the South, reared amidst its classic shades, were nurtured upon its generous bosom, and breathed its soft and sunny airs. In after life they reflected its chivalry in their intellectual strength and courtly manners—a fine, idealized manhood. They have left imperishable records of wisdom, purity, and truth. They were great men. To-day in cosmopolitan New York and in quaint, quiet Philadelphia many of the most prominent members of the profession are Southern-born. Wyeth, Emmet, Thomas, Wylie, Polk—to pronounce their names is to awaken echoes from Virginia's lofty

mountains, from the broad Savannahs of Georgia and the Carolinas; from the soughing surges of the Mexican Gulf as they break upon the coasts of Louisiana and Mississippi, or the sweet winds which blow soft and fresh over the vales and hills of beautiful Alabama and brave Tennessee.

Professional New York is adorned and strengthened by these manly men. They are her boast and her pride. With what pride, then, should you, gentlemen of this Association, glow—should the entire profession glow—at such deserved success and such pre-eminence, when you reflect that though environed by section your aspirations are too broad to be bound by local limits. They reach far beyond, yet your ministrations are among Southern women—the noble women whom we all honor and trust and love. Whence came these, and from what ancestry did they spring? Let the heraldry of Virginia answer to her scions who have peopled all this fair and sunny land. Let the Huguenot blood of the Carolinas answer as it speaks in brave, though mournful tones of cruel oppression, of religious intolerance and persecution, of expatriation for conscience' sake and freedom to worship God. Our women are descended from mothers pure and chaste, noble and grand. In person beautiful, in sentiment lofty, the peers of the proudest matrons of England's noblest blood—a type of womanhood the world has not surpassed. To these has been transmitted fine physical mould, simple dignity of mien, lovely and gentle manners, symmetry of character grounded to the perfection of matchless grace. These are your mothers, sisters, and wives. These are your patrons. To such it is your fortune to minister, for, beautiful as they are, they are often the victims of disease. How often do they pass under the surgeon's hands or try the physician's skill? How pitifully do they appeal to you as stricken suppliants? Before them bow deferentially, do you vow as you stand beside them with keen, burnished blade, with strained nerve, tense and strong, with trained and skilful touch, and with hearts pure and true. To them ever be gentle and kind.

Our profession demands the holiest motives and the purest of purposes. Such originally called you into its ranks and holds you there by the most imperative law—the law of beauty and devotion to suffering womanhood—dependent womanhood, leaning trustingly on your strong professional arm. "Like the vine the oak hath shaken off, she bends lovingly and lightly to her

tendrils again," and appeals to you for sympathy, for succor, for love, and for life. Be it yours, gentlemen of this Association, to preserve your trust as a heritage sent from God, the acme of "the true, the beautiful, and the good." (Loud applause.)

RESPONSE TO THE ADDRESS OF WELCOME BY PRESIDENT DOUGLAS.

Mr. Speaker and Fellows of the Southern Surgical and Gynecological Association: It is my pleasing duty to most cheerfully acknowledge these gracious words of hospitality, this cordial welcome, so eloquently extended to us. It is the aim, it is the personal ambition of the Fellows of this Association that some of us shall rise to be the worthy successors of the distinguished men to whom you, sir, so tenderly referred. Permit me, then, Mr. Speaker, on behalf of the Southern Surgical and Gynecological Association, to most cordially thank you for the kindly welcome that you have extended to us. We feel that the citizens of Memphis and the profession all have an unusual interest in our coming, and we trust that the meeting will be profitable to all. (Applause.)

Dr. R. B. Maury, chairman of the Committee of Arrangements, made the following verbal report:

REPORT OF THE COMMITTEE OF ARRANGEMENTS.

Mr. President and Members of the Southern Surgical and Gynecological Association: On behalf of the Committee of Arrangements I have to state that a reception will be given to the Association by the Memphis Medical Society in the parlors of this hotel to-morrow (Wednesday) evening at 9 o'clock. All of the members, their wives and guests, it is hoped, will be present. I also take pleasure in announcing that there will be tendered to you by the chairman of the Committee of Arrangements a reception at his residence, Tuesday evening, at 9 o'clock. A cordial invitation is extended to our invited guests.

The people of Memphis have looked forward with much interest to your coming, and they extend to you a hearty welcome. It is our desire to make your stay in this city in every way comfortable and pleasant. (Applause.)

By vote of the Council members of the local profession of Memphis were invited to participate in the discussions on papers.

Papers were then read as follows:

1. "Gunshot Wounds," by Dr. William E. Parker, of New Orleans, La.

2. "Penetrating Wounds of the Abdomen," by Dr. F. W. McRae, of Atlanta, Ga.

3. "The Practical Side of the Treatment of Bullet Wounds of the Abdomen," by Dr. H. H. Grant, of Louisville, Ky.

These papers were then discussed jointly by Drs. Grant, Campbell, Robinson, Brown, Parker, Westmoreland, Davis, Baxter, Wilson, Rodman, Westmoreland, Field, and the discussion closed by the essayists.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session.—The Association reassembled at 2.30 P.M., and was called to order by the President.

4. "Plastic Surgery in Gynecology," by Dr. W. D. Haggard, Jr., of Nashville, Tenn.

5. "The Treatment of Complete Rupture of the Perineum by Dissecting out the Sphincter Muscle and its Direct Union by Buried Sutures," by Dr. Howard A. Kelly, of Baltimore.

These two papers were discussed together by Drs. Noble, Bovée, and in closing by the essayists.

6. "Treatment of Cancer of the Uterus," by Dr. Lewis S. McMurtry, of Louisville, Ky.

Discussed by Drs. Rodman, Lewis, Hardon, Kelly, Bovée, Robinson, Davis, and in closing by the essayist.

7. "Fractures Involving the Elbow-joint," by Dr. John T. Wilson, of Sherman, Texas.

Discussed by Drs. Cartledge, Westmoreland, Tiffany, Baxter, Rogers, and in closing by Dr. Wilson.

8. "The Use and Abuse of Normal Salt Solution," by Dr. J. Wesley Bovée, of Washington, D. C.

Discussed by Drs. Parker, Johnson, Noble, Parham, Cartledge, Tiffany, Kelly, McMurtry, Baxter, McRae, Brown, and in closing by Dr. Bovée.

On motion, the Association adjourned until Wednesday, 9.30 A.M.

SECOND DAY.—*Wednesday, December* 7, 1898.

Morning Session.—The Association met at 9.30 A.M., and was called to order by the President.

9. "Conservative Treatment of the Diseased Ovary," by Dr. Joseph Taber Johnson, of Washington, D. C.

Discussed by Drs. Kelly, Stone, McMurtry, Bovée, Lewis, and in closing by the essayist.

At this juncture, in the absence of either of the Vice-Presidents, the Chair was taken by Dr. Tiffany, and President Douglas delivered his address. He selected for his subject "Acute General Peritonitis."

On motion of Dr. McMurtry, the unanimous thanks of the Association were tendered to the President for his very able address.

On motion of Dr. Kelly, the Secretary was instructed to issue the address in reprint form for convenience and distribution.

10. "When Shall we Operate for Appendicitis?" by Dr. A. M. Cartledge, of Louisville, Ky.

Discussed by Dr. Tiffany, after which further discussion was postponed until the afternoon session.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session.—The Association reassembled at 2.30 P.M., and was called to order by the President.

Before the discussion on Dr. Cartledge's paper was resumed Dr. Cartledge was asked to read his conclusions, in order to restore the continuity of the thought, which he did.

Discussion was then resumed by Drs. Bovée, Grant, Parker, Kelly, Rogers, Stone, Douglas, Parham, and the discussion closed by the essayist.

11. "Ureteral Anastomosis," by Dr. George H. Noble, of Atlanta, Ga.

Discussed by Drs. Kelly, Bovée, and in closing by Dr. Noble.

12. "Cancer of the Breast," by Dr. Willis F. Westmoreland, of Atlanta, Ga.

Discussed by Drs. Cartledge, Parker, Parham, and in closing by the essayist.

The Auditing Committee, consisting of Drs. Baxter, Hardon, and Wilson, reported having examined the books and vouchers of the Treasurer and Secretary, and found them correct and the books neatly kept.

On motion, the Association adjourned until Thursday, 9.30 o'clock.

THIRD DAY.—*Thursday, December 8, 1898.*

Morning Session.—The Association met at 9.30 o'clock, and was called to order by the President.

13. "The Rarity of Ovarian Tumors in Negresses," by Dr. I. S. Stone, of Washington, D. C.

Discussed by Drs. Robinson, Bovée, Baxter, and Johnson.

14. "Penetrating Wounds of the Chest," by Dr. J. B. Murfree, of Murfreesboro, Tenn.

Discussed by Drs. Tiffany, Baxter, and in closing by the essayist.

15. "Antistreptococcic Serum in Puerperal Fever, Erysipelas, and Post-operative Septic Fever," by Dr. W. L. Robinson, of Danville, Va.

Discussed by Drs. Stone, Parham, Bovée, Westmoreland, and the discussion closed by the essayist.

16. "Thoracotomy for Tumors Involving the Ribs, with a report of Two Cases of Osteosarcoma of the Thoracic Skeleton," by Dr. F. W. Parham, of New Orleans, La.

Discussed by Drs. Tiffany, Elkins, Parker, and in closing by the essayist.

Dr. McMurtry read the report of the Council, as follows:

REPORT OF THE COUNCIL.

The following applications for membership are complete, and the applicants are recommended:

Dr. George S. Brown, Birmingham, Ala.
Dr. Walter B. Platt, Baltimore, Md.
Dr. F. T. Meriwether, Asheville, N. C.

The following applications were found to be incomplete, inasmuch as the requirements of the Constitution as to the filing of a paper with each application for membership was not fulfilled:

Dr. I. S. Watkins, Montgomery, Ala.
Dr. Herman Gessner, New Orleans, La.
Dr. Erasmus Fenner, New Orleans, La.
Dr. C. Jeff. Miller, New Orleans, La.
Dr. W. W. Taylor, Memphis, Tenn.

These applicants are recommended for election to membership provisionally, so that their election will be unconditional when the Constitutional requirement already mentioned is complied with.

The following recommendations as to officers, place, and time of meeting are submitted :

President—Dr. Joseph Taber Johnson, Washington, D. C.

Vice-Presidents—Drs. F. W. Parham, New Orleans, La., and W. L. Robinson, Danville, Va.

To fill vacancy in the Council—Dr. Louis McLane Tiffany, of Baltimore, Md.

Place of meeting—New Orleans. Time of meeting to be determined by the Secretary, with advice of the Council.

Respectfully submitted,

RICHARD DOUGLAS,
Acting President of the Council.

L. S. MCMURTRY,
Acting Secretary.

Dr. Parker moved that the report of the Council be accepted and adopted ; carried.

The President appointed Drs. Wilson and Stone to escort the President-elect to the chair.

Dr. Johnson, in accepting the Presidency of the Association, said : After listening to the papers and discussions of the last three days, most of you must be tired. But a man would have the heart of adamant, which I do not possess, to let this occasion go by without returning his heartfelt thanks and expressing his deepest and most profound gratitude for the courteous action of this Association giving to a man, who has not been a member of it from its beginning and who expected nothing at this meeting, the highest honor in its gift. It is an honor to belong to this Association, and it is a tenfold greater honor to be lifted to the highest position in its gift. I want to assure you from the bottom of my heart that I appreciate most highly the honor that you have conferred upon me. To sit in the chair which has been occupied by the illustrious men who have preceded me is still further an honor which I greatly appreciate. Since I became a member of the Association the chair has been filled by Hunter McGuire, Bedford Brown, of grateful memory ; Tiffany, of Baltimore ; Engelmann, of Boston, but formerly of St. Louis ; McMurtry, of Louisville ; George Ben Johnston, and now Richard Douglas, of Nashville, whose adminstration has been dignified and most able during the last three days. His masterly and scientific address of yesterday places the presidential occupants of the chair in a position where few will be ever able to equal it.

and none, I am sure, surpass it. This Association has a mission which I hope we all appreciate in this large Southern country, where men are scattered more widely than in those parts of the country that are more thickly settled. This Association has a mission which it has been accomplishing with great ability, and that is of bringing men together from the distant parts of the Southern portion of our country and of making acquaintances, forming friendships and associations which are useful and beneficial to us all. This is part of the missionary work of this Association, which we hope it will still further accomplish in the future. There are many men who are working quietly in different parts of this portion of our country who ought to be members of this Association. They owe it to themselves, they owe it to us, and much benefit would be derived from more mutual association.

I trust the coming meeting in New Orleans, both in scientific interest and good fellowship, will not fall behind any of the preceding ones. I hope, too, the volume of Transactions which will result from the scientific work of the New Orleans meeting will not fall behind any of its predecessors. Everything I can do to increase the interest of the meeting is certainly pledged to that object. But you know very well the chairman can do very little except to keep the body in order; but it is from you, who have so generously acted in another respect, that I shall bespeak still further generous action in enabling my administration to surpass, if possible, the meetings that have gone before. Again I thank you for the distinguished honor conferred, and will detain you no longer with remarks. (Applause).

Dr. Douglas, the retiring President, said: In surrendering the gavel to a gentleman so widely distinguished for his professional attainments and so universally popular I feel that the success of the Southern Surgical and Gynecological Association is assured for another year. And now, gentlemen, in retiring from the chair permit me to most cordially and earnestly thank you for the consideration and kindness with which you have treated me. Without your consideration and co-operation I am sure the duties of the President would have been far more arduous. Gentlemen, I thank you. (Applause).

On motion of Dr. Douglas, a vote of thanks was extended to the Secretary, Dr. Davis, for his efficient and valuable services.

Dr. W. D. Haggard, Jr., offered the following resolutions:

In concluding the very pleasant and profitable session the

Fellows of the Association desire to express their appreciation for the comforts and pleasure of the meeting in Memphis; therefore, be it

Resolved, (1) That the heartfelt thanks of the Southern Surgical and Gynecological Association be tendered the Committee of Arrangements and its chairman, Dr. R. B. Maury, for their ample provision for our delightful entertainment.

(2) That the hospitality of Dr. and Mrs. Maury in the enjoyable reception with which they honored the Association be hereby collectively acknowledged by the Fellows.

(3) That the Memphis Medical Society, the profession of Memphis, the beauty and chivalry which graced the reception at the Gayoso, be accorded our appreciative recognition.

On motion, the resolutions were unanimously adopted.

17. "A Case of Vesico-rectal Fistula of Seven Years' Standing; Preliminary Iliac Colostomy; Fistula Closed at Fifth Operation," by Dr. George S. Brown, of Birmingham, Ala.

Discussed by Drs. Parker, Kelly, Davis, and the discussion closed by the essayist.

The following papers were read by title:

1. "Abdominal Opening for Intraperitoneal Surgical Work," by Dr. Joseph Price, of Philadelphia, Pa.

2. "The Pelvic Floor: Its Functions, Injuries, and Repair," by Dr. M. C. McGannon, of Nashville, Tenn.

3. "A Report of Fifty Prostatectomies, with Remarks on the Treatment of Prostatic Overgrowth in the Aged," by Dr. John P. Bryson, of St. Louis, Mo.

4. "Remarks on the Surgery of the Gall-bladder and Bile Ducts," by Dr. A. V. L. Brokaw, of St. Louis, Mo.

5. "Past and Present Surgery of the Gall-bladder and Bile Ducts," by Dr. William H. Myers, of Fort Wayne, Ind.

6. "Surgery of the Pelvic Organs without Speculums or Retractors," by Dr. W. H. Wathen, of Louisville, Ky.

7. "Ovarian Cysts as a Complication of Pregnancy and Labor," by Dr. J. W. Long, of Salisbury, N. C.

8. "Report of a Case of Splenectomy for Wandering Hypertrophied Spleen," by Dr. Wyatt Heflin, of Birmingham, Ala.

9. "The Management of Pregnancy Complicating Intra-abdominal Tumors, with Cases," by Dr. Rufus B. Hall, of Cincinnati, Ohio.

10. "The History of Myomectomy," by Dr. Charles P. Noble, of Philadelphia, Pa.

11. "Ventro-fixation for Retrodisplacements of the Uterus," by Dr. R. J. Trippe, of Chattanooga, Tenn.

12. "Celiotomy in the Treatment of Retroverted Pregnant Uterus when Incarcerated," by Dr. Henry D. Fry, of Washington, D. C.

13. "Odds and Ends in Pelvic Surgery," by Dr. Walter B. Dorsett, of St. Louis, Mo.

14. "Mechanical Aids in Intestinal Surgery," by Dr. John D. S. Davis, of Birmingham, Ala.

15. "The New Era in the Treatment of Nervous Diseases," by Dr. John B. Sherwood-Dunn, of Boston, Mass.

16. "Electro-therapeutics in Medicine and Surgery," by Dr. James McFadden Gaston, of Atlanta, Ga.

17. "Foreign Bodies in the Œsophagus, with Report of Cases," by Dr. A. Vander Veer, of Albany, N. Y.

18. "Incised Wounds of the Larynx," by Dr. Edwin Walker, of Evansville, Ind.

19. "A Plea for the Radical Cure of Inguinal Hernia, with Technique of Operation," by Dr. Dyer F. Talley, of Birmingham, Ala.

20. "Report of Cases: (1) Ovarian Cyst from a Girl of Seventeen, Containing Five Gallons of Fluid; (2) Suppurating Dermoid Cyst Complicating Pregnancy," by Dr. R. R. Kime, of Atlanta, Ga.

21. "Diagnosis and Operative Treatment of Tumors of the Lower Maxilla," by Edmund Souchon, of New Orleans, La.

22. "The Normal Position of the Uterus Defined," by Dr. A. H. Buckmaster, of Charlottesville, Va.

23. "Observations upon Cranial Operations, with Report of Cases," by Dr. William Perrin Nicholson, of Atlanta, Ga.

24. "Craniectomy for Microcephalic Idiocy," by Dr. H. Tuholske, of St. Louis, Mo.

25. "Tubal Pegnancy; Primary Rupture into the Broad Ligament and Secondary into the Peritoneum; Laparotomy, Convalescence Complicated by Septic Diarrhœa and Metastatic Abscess of the Liver; Transpleural Hepatotomy by Resection of the Rib, and Free Incision; Recovery," by Dr. R. Matas, of New Orleans, La.

On motion, the Association adjourned to meet in New Orleans, La., in 1899.

W. E. B. Davis,
Secretary.

THE PRESIDENT'S ADDRESS.

ACUTE GENERAL PERITONITIS.

By Richard Douglas, M.D.,
Nashville, Tenn.

As President of this distinguished body I am fully conscious of my exalted position and deeply sensible of the friendly spirit and kindly good-will that has induced you to so honor me. This Association, in the ten short years of its history, has become renowned for the excellence of its scientific work, the truthfulness of its records, and the spirit of warm friendship that pervades its membership, and we cannot too cordially express our thanks to Dr. W. E. B. Davis, our Secretary, to whose indefatigable efforts the Southern Surgical and Gynecological Association owes its existence and high standing; nor are we unmindful of our obligations to my distinguished predecessors, who, by their justice, courtesy, and dignity in office and wisdom in council, have guided our deliberations and smoothed our difficulties.

Perhaps a true interpretation of my duties of the hour would demand that I address you by recounting our recent deeds of prowess, arranging in chronological order the victories the allied armies—the science and art of surgery—have won in the great battle against disease and death, or in telling of recent discoveries, new devices, and modifications of technique—the territorial acquisitions of our profession; yet, inasmuch as the greatest latitude is granted me, I prefer to restrict my remarks to a very commonplace subject, but one in which both branches of this Association feel a common interest—that of acute general peritonitis.

A proper appreciation of the time of the Association will not permit me to discuss this subject in all its phases, and for that reason I shall confine myself to an effort to present to you a workable classification. As an introduction to the subject I shall first consider the attempts that have been made to form a classification on a bacteriological basis.

Bacteriology. A bacteriological classification of peritonitis is beset with many difficulties, and, while I am free to admit that for all practical purposes peritonitis is of bacterial origin, yet there occurs a respectable percentage of cases in which the most rigid examination fails to disclose the presence of microorganisms. Hartmann and Moreau report in detail such a case recently. Out of 110 cases bacteriologically classified by Flexner there were twelve cases which he was obliged to consign to the idiopathic group. It is true that in all of these patients there existed conditions predisposing to peritonitis, such as cardiac, renal, or hepatic disease. In the intensely septic mycotic form of peritonitis their absence may be accounted for by the fulminant type of the disease, death occurring from intoxication before the colonies of bacteria are well established. Any effort to individualize the effect of a specific bacterium—to connect its presence with a definite pathological phenomenon and characteristic symptomatology—is, as yet, futile. That they attack the peritoneum in different ways; that they possess a diversity of virulence and of action; and that peritonitis excited by some varieties is more amenable to treatment than others, is proved; but we cannot, by symptoms, distinguish a streptococcus infection from one due to colon bacillus. Mikulicz avers that all forms of peritonitis run the same clinical course, regardless of the bacteria that cause it. There is a law laid down by Maloz to the effect that if the peritonitis is of intestinal origin the colon bacillus will show it, if it is of uterine origin—that is, connected with abortions or labor—we will find the streptococcus. It is asserted that the colon bacillus constitutes nine-tenths of the bacteria of the digestive tract. The colon is its natural habitat, but its behavior upon gaining entrance to the peritoneal cavity

depends upon many circumstances, and, as Robinson says, this bacillus has many morphological conditions, many forms and stages. The constancy of its presence, however, in peritonitis since the demonstrations of Welch and others of its capacity of transmigration through the bowel, has led many to attach to it great significance as an etiological factor; but its association with other forms of micro-organisms renders the first proposition of Maloz's law null and void. To say that streptococcus peritonitis is of uterine origin is assuming entirely too much. Would we be willing in any medico-legal case to charge, if a peritoneal fluid revealed streptococcus cultures, that pregnancy had existed? In a recent number of the *Medical Record* William R. Pryor records a case of streptococcus peritonitis. Two specimens were examined. Scrapings from the uterine cavity showed pure growths of streptococcus. In the twelve ounces of pus that escaped through the cul-de-sac incision from the cavity there was "an abundant growth of bacilli, with a small number of colonies of streptococci." When the gauze was first removed from the peritoneal cavity the culture from a specimen of pus taken then showed only the colon bacillus, no streptococcus. Whose child was this peritonitis?—the colon bacillus or the streptococcus? The clinical symptoms given do not justify it being assigned exclusively to one or the other; the bacteriological examination certainly revealed the bacillus as the most predominant and persistent germ, yet it was reported as a streptococcus peritonitis.

The microscopical findings in just such a case vitiate any such law as Maloz has attempted to establish. If we interpret Maloz's law correctly the absence of streptococci would eliminate the possibility of peritonitis being of puerperal origin. In rebuttal of this idea I would quote from Winckel. He says: "Krœnig examined all parts of a uterus of a woman dead from infection, and found not only the superficial thrombi at the placental site thickly filled with bacteria, but also the serous lining of the peritoneum." This case shows that we can have a peritonitis following abortion without streptococci, and it further shows that the colon bacillus without an intes-

tinal lesion may produce a fatal peritonitis; yet there is no fact so well established as that the streptococcus is the most frequent exciter and that it is the predominant pus-producing micro-organisms in the lymphatic system—a position strongly maintained by Fränkel. No doubt too much importance has been ascribed to the colon bacillus, and "it is interesting to find that Tavel, who was among the first to emphasize the pathogenic powers of the bacillus coli communis, now thinks it the bacillus of minor importance in the etiology of peritonitis" (Curtis.) He holds, further, that the very name of the bacillus coli should be considered merely a collective name of many varieties of bacteria.

The well-known character of staphylococcus to produce a limited area of infection practically eliminates it as an etiological factor in general peritonitis; its presence in connection with other micro-organisms is frequently demonstrated.

As soon as it was established that puerperal sepsis and its fatal complication, peritonitis, is a preventable disease it was but natural for the surgeon to seek some loophole through which he might escape censure should he be so unfortunate as to have it occurring in his practice; and we all know how quickly his ingenuity came to the rescue, and deaths were ascribed to auto-infection from ruptured pus-tube due to the mechanical violence of labor. How easy it is to get a clinical history upon which gonorrhœal infection may be assumed! In a much-quoted and rather vaunted symposium upon peritonitis the author attaches great importance to the gonorrhœal origin of peritonitis, and speaks of the rupture of pathogenic cysts of gonorrhœal origin during the mechanical violence of labor. How are these ideas sustained by bacteriologists? Bumm and Saenger, in their experiments, limited the pathogenic property of the gonococcus to the superficial surface of the mucous membrane and of the peritoneum, claiming that it never entered the blood or lymph-channels, consequently could not cause general sepsis; and, therefore, if general peritonitis occurred, although the existence of gonorrhœa was well established, the peritonitis was due to a mixed infection. Con-

trary to the observation of Bumm and Saenger, Wertheim saw the bacteria of Neisser on the surface of the peritoneum creeping in along under the serosa into the deeper tissues and penetrating single muscle-bundles. He further demonstrated that a pus-tube of gonorrhœal origin never contained any other pyogenic bacteria. Menge confirmed this statement—that gonococci rarely form a symbosis with other bacteria—and demonstrated the presence of this bacterium in the muscular wall of the tube. These experimenters prove that the human peritoneum can be and is liable to inflammation by the gonococcus (Winckel)—a fact that has been thoroughly established by numerous later observers. Sufficient has been said to show that the bacteriological classification of acute peritonitis is, as yet, premature and unsubstantial, for this reason: the observations of the bacteriologist are either experimental, post-operative, or post-mortem, and therefore not applicable for diagnostic purposes, and even in the hands of skilled pathologists the results are contradictory and unreliable.

No better argument against bacteriological classification can be adduced than the words of Simon Flexner, who says: "In order that pathogenic bacteria introduced directly into the peritoneal cavity may cause a peritonitis, general or circumscribed, evanescent or fatal, the normal conditions of the peritoneum must in some way be modified." It must be clear, then, that in the human being, as in experimental animals, some other condition than the mere presence of pathogenic micro-organisms in the abdominal cavity is necessary in order that peritonitis may be produced. Bacteria alone and unaided by physical conditions are comparatively innoxious.

From out of the confusion and uncertainty of a bacteriological study of peritonitis we naturally seek for something more practical, and we accept as a beacon the admission of the bacteriologist that some other factor, mechanical or chemical, must be present in order to render the peritoneum susceptible to the invasion of micro-organisms. Is not the disease supplying these conditions the source, the initial lesion from whence the bacteria gain their power? And such disease,

then, is the true cause. Peritonitis is but an extension of a primary pathology. The only exceptions we must make to this are those few cases in which the cause has not yet been demonstrated, and honesty compels us to assign them to the idiopathic group. A classification, then, based upon the etiology of the disease, appeals to us from its scientific exactness; it admits of clinical adaptation; it forever destroys the false hopes of medication and serum-therapy, and spurs the surgeon on to action, very definitely guiding him in his undertaking. Restricting our consideration entirely to acute general peritonitis, we find that it occurs from traumatic or consecutive causes, and, as these terms are broadly used, perhaps it is well to explain that under the head of traumatic peritonitis is embraced all infective inflammations arising from wounds of the peritoneum, whether accidental or operative, penetrating or non-penetrating. Consecutive, secondary, or symptomatic peritonitis may be subdivided into two varieties: (1) peritonitis by continuity and (2) perforation peritonitis.

Traumatic Peritonitis. We must embrace under this head all forms of peritonitis due primarily to a trauma. The destruction of tissue, the retention of blood-clots and natural secretions prepares a suitable soil for microbic invasion, and this essential infecting element may be introduced from without, as through penetrating gunshot, stab, or operative wounds, under which circumstances it is usually a poly-infection, the streptococcus predominating. There are also contusions of the abdomen, without an external wound, which so injure and lower the resistance of the tissue as to favor the migration of the intestinal micro-organisms and their infection of the general cavity. The most serious types of traumatic peritonitis are those of post-operative origin, and while it is true that modern ascepticism has to a great extent eliminated this *bête noir* of the early laparotomist, yet its occurrence is sufficiently frequent with all of us for me to repeat with emphasis the striking words of Nancrede: "No perfection of aseptic technique will invariably render innoxious faults or misfor-

tunes of operative technique." The needless exposure of the peritoneum to chilled atmosphere, rude manipulations, the destruction of the peritoneal endothelium by vigorous sponging, the failure to barricade with gauze the healthier tissues while dealing with an infected area, neglect to cover all raw surfaces with peritoneum, ligature *en masse* of great chunks of tissue, unnecessary, improper, or insufficient drainage are some of the errors of technique which we commit in violation of the principles of surgery and common sense in our idolatrous attention to the almighty germ.

Secondary Peritonitis. The supervention of acute general peritonitis as secondary to pre-existing disease processes embraces in its etiology infective inflammations not only of all intraperitoneal viscera, but all organs or tissues contiguous thereto; and it does not appear to me to be too broad if we include within its scope those peritonitides of hæmatogenic or metastatic origin, for it is well established that the specific germs of diphtheria, scarlet fever, pneumonia, and erysipelas have produced acute general peritonitis.

Peritonitis by continuity is the uninterrupted extension of the inflammation from an infected area to the peritoneum, and is accomplished by the invading army of micro-organisms through the lymphatics, blood-channels, or by direct penetration of the tissues. The reactionary inflammation which determines the localization or diffusion depends upon the virulence of the bacteria, the resistance of the tissues, and, what is too frequently overlooked, but impressively stated by McBurney, the individual resistance of the patient. Puerperal peritonitis of streptococcus origin conspicuously illustrates inflammation by continuity. It is immaterial whether the infection atrium is the vagina, cervix, or at the placental site. The progress of the infection to its fatal termination, leaving the uterine muscle relaxed, succulent, and paralyzed; the connective tissues soft, œdematous, and jelly-like; the lymphatics varicosed, "dilated like the beads of a rosary" (Winckel), their walls thickened, contents often purulent throughout; intramuscular lacunæ of pus, destroyed thrombi, is the wasted

territory over which the avenging army of invasion has marched to the peritoneum; or else they may creep through the tissues, leaving no trace of their progress until the field of battle—the peritoneum—is reached. That there are local and constitutional conditions in the puerperal state rendering susceptible these patients to the diffusion of infection which does not obtain under other circumstances, goes without saying; yet septic areas in the liver, spleen, pancreas, appendix, kidneys, mesenteric glands, vertebra, lungs, pleura, abdominal parietes, genito-urinary tract, and neoplasms, by extension without perforation, may give rise to a general peritonitis. The peculiar pathogenic organism in a peritonitis so excited varies with the character of the initial cause. In the beginning we may have been concerned alone with the streptococcus, the staphylococcus, or the diplococcus, a bacillus typhosus or the amœba dysenterica; it is the exception for a consecutive or secondary peritonitis to yield a pure culture; sooner or later the colon bacillus enters upon the stage to play its part, whatever that may be. In intestinal obstruction with arrested peristalsis, stagnant circulation, and fermenting contents we have the well-appointed stage, the locus minoris resistentiæ, upon which the bacillus coli plays the star engagement.

Perforation peritonitis is the next subdivision of secondary peritonitis. The sudden opening of a focus of suppuration and the discharge of its contents into the peritoneal cavity, whether it be from hepatic abscess, a pus-tube, or mesenteric gland, is a true illustration of perforation peritonitis; yet the inflammation and systemic infection following is not necessarily so conspicuous. The duration of the primary disease, the virulence of the micro-organism, the preparedness of the peritoneum by fortifications of adhesions, the general condition of the patient, are all circumstances which may modify and circumscribe the peritonitis. It is more common for perforation peritonitis to occur as a result of ulceration of the wall of some of the hollow viscera, as in peptic ulcer, typhoid and dysenteric intestinal ulceration, duodenal and appendicular ulceration. Such a pathological communication established

with the peritoneal cavity is vastly more important than any of the other secondary forms; for then escape in activity and virulence large numbers of bacteria, accompanied by the contents of the viscus so perforated, which in itself, if rendered sterile, would by its mechanical and chemical action excite an aseptic inflammation. With perforation, then, we have the three essential prerequisites for an active inflammation—a foreign substance, chemical irritation (hence lowered resistance), and bacteria. It is not surprising, then, that the majority of cases of acute general peritonitis fall under the etiological class of perforation peritonitis. The diseased process leading to perforation may have been exceedingly slow —so latent in its form and symptoms as to be wholly unsuspected, as in duodenal or gastric perforations; or it may occur as the legitimate pathology of a specific disease, as in typhoid ulceration. However that may be, the knowledge that perforation peritonitis is a symptomatic condition should direct us at once in our clinical investigation, and we know that certain areas of the peritoneum—certain districts of the abdominal cavity, the appendicular, duodenal, and stomach regions in the order named—are particularly liable to invasion by perforation, just as we know that the pelvis is more frequently the site of localized peritonitis by continuity. The location of the perforation has other than a diagnostic bearing. Unless the process has been gradual and nature has had time to establish adhesions, the higher in the peritoneal cavity the perforation the greater the tendency to diffusion and general infection. For this reason a duodenal or gall-bladder perforation is relatively more serious than a ruptured Fallopian tube. I do not wish to convey the idea, however, which seems to possess more than one writer on this subject, that infection does not spread from the pelvis because it is uphill, and that a gastric ulcer is generally surrounded by adhesions, and the peritoneum escapes general infection because the bacteria cannot climb over the transverse colon.

We all know that general peritonitis and profound septic intoxication may follow perforation of the appendix when that

organ lies deep in the cavity of the pelvis. The intraperitoneal currents quickly carry the toxins to the great absorptive area, the under surface of the diaphragm.

The conclusions that we may draw from this etiological study of peritonitis may be thus summarized: Traumatic peritonitis, especially the post-operative variety, is essentially a grave condition, not only because there is immediate or primary inoculation of the peritoneum, but the conditions are all favorable for germ-culture and dissemination. Peritonitis by continuity may become general and prove rapidly fatal, but this is not the rule except in puerperal cases. Contrary to the expressed opinion of more than one writer, there is nothing peculiar about the peritoneum of the cæcum or appendix or the true pelvis which accounts for the more frequent localization of inflammation in these regions than in other areas of the abdomen. The method of invasion, the activity of the process, and the resistance of the patient alone determines the local or general type of peritonitis. The force of gravity is a minor element in limiting peritonitis to the pelvis. Visceral perforation, whether traumatic or pathologic, is an ideal condition for germ-culture and the elaboration of toxins. Their rapid absorption and general diffusion throughout the peritoneum sufficiently explains the grave state into which the patient is preciptated. It may be asserted that the clinical course and pathological expression depend largely upon the nature of the exciting cause, the character of the pre-existing disease or injury, and the mode of invasion. Without attempting to formulate any definite pathological classification of general peritonitis, and to adapt each to its special cause, I prefer to direct my efforts to simplifying and dispelling the confusion that exists. I accept with slight reservation the now almost universally conceded idea that acute general peritonitis is and must be septic—that is, of bacterial origin—but I do maintain that we, as surgeons, do not understand each other, nor have all of us a clear conception of what is meant by septic peritonitis. It has been a race for life between the practical surgeon and bacteriologist as to who should claim

the honor of naming the pathological phenomena in this great serous bursa. I maintain that the surgeon is alone competent to define, classify, and prognosticate the protean types of this disease. The confusion that exists is attributable to his courteous effort to adapt his clinical observations to the findings of the bacteriologist. That men are honest, painstaking, and accurate, goes without saying; yet how can we reconcile the report of McCosh's last series of eight cases of general septic peritonitis and six operative recoveries with the experience of Senn, "of many cases of diffuse septic peritonitis without a single successful result?" The answer certainly is not in the superior skill or special technique of the operator, but it is to be found in an analytical study of McCosh's cases—six of them were purulent peritonitis and two serous peritonitis—not the class of cases referred to by Senn at all. Again, that beautiful English writer and eminent surgeon, Lockwood, defines septic peritonitis as a bacterial invasion with varied clinical reflexes, unmindful of the pressing necessity of specifically defining septic peritonitis; but his colleague, Frederick Treves, is more practical, and draws a sharp distinction between the varieties of peritonitis, and is unmistakably clear in his definition of diffuse septic peritonitis, emphasizing its virulent feature, septicæmia, and the comparatively insignificant peritoneal pathology. The German surgeons are more in accord with each other. Enthusiastic bacteriologists, they are none the less expert pathologists and skilled surgeons, and they have clearly differentiated the deadly diffuse septic peritonitis from all forms bearing effusion. Their conception of the condition is clearly stated by Tietze, who defines diffuse septic peritonitis to be "that form of peritonitis in which there is little or no exudate, severe symptoms of intoxication, and terminating rapidly fatally." That this definition most appropriately describes many cases of post-operative and perforation peritonitis every Fellow of this Society will sadly admit, and that there is a wide difference, as yet an unbridged chasm, separating these foudroyant types of infection from the milder cases. Some four years ago I submitted at our Char-

leston meeting a report of eight cases of general peritonitis subjected to operation, with four recoveries and four deaths. I dealt with them all as cases of general septic peritonitis, from a misconception of the term. Two of them only belonged to this class, and they terminated fatally; the others were cases of general purulent peritonitis, with two deaths and four recoveries. I am very well pleased with my percentage of recoveries yet, but disgusted with my classification. I did not discriminate between diffuse septic peritonitis, dying in twelve hours with profound toxæmia, and dry peritoneum after perforation of an appendix, and one of perforation with enormous purulent effusion, but mild symptoms of sepsis. This error of mine is the common one with the profession, and it is the outcome of an attempt to classify peritonitis by the character of the exudate. The terms serous, hemorrhagic, fibrinous, suppurative, or putrid peritonitis convey but a superficial observation that the merest tyro might make, and in no sense does it designate the origin, define the general condition of the patient, or determine the prognosis of the case. The various effusions are but physical expressions of the intensity of the infective process upon the one hand and the degree of phagocytosis on the other; or, expressed otherwise, a fibrinous peritonitis indicates a mild infection or a strong effort on the part of the peritoneum to limit or localize a severe inflammatory condition, while a purulent accumulation denotes a virulent infection or else weaker resistance—breaking down nature's attempt at fibrinous barriers. Our surgical memoranda abound with cases bombastically described as "general septic peritonitis," "belly full of pus," "intestines swimming in pus," "quarts of pus gushing forth," "pus from diaphragm to pelvis," "operation and recovery," conveying the idea that the more pus the greater the skill of the surgeon.

If we are correct in assuming that acute general peritonitis has as one of the potent factors in its production bacteria and their products, it is unfortunate to confound our nomenclature with the term *septic peritonitis*. It is true that if it could be

sufficiently explained that the word septic referred to the general condition of the patient, perhaps it would not be so delusive; but even then it would be unfortunate, for it would be only a relative term. All of us have seen cases—exceptional, it is true—that have gone on for some hours, perhaps days, bearing a large, purulent effusion with pulse, temperature, and respiration within normal bounds. Is it not more descriptive and less confusing, when we wish to convey the idea of intense systemic infection, to accept the term of intestino-peritoneal septicæmia?—first used, I believe, by Dr. Malcome, of Edinburgh; and I use this term synonymously with that of diffuse or general septic peritonitis. The macroscopical appearance of the peritoneum in this condition is not indicative of the intense systemic infection. Death occurs in these cases from nerve-shock and the rapid absorption of intestinal toxins escaping through the perforation before pronounced peritoneal inflammation can occur. A few ounces or less of indifferent fluid is all that we may see in some instances. If the patient survives long enough the general peritoneum may appear scarlet-red and dry (Robinson).

Intestino-peritoneal septicæmia is, then, acute general septic peritonitis; it is the acute diffuse septic peritonitis of some authors. The word diffuse is misleading. Greig Smith defines "diffusive peritonitis" to be "from extravasation of aseptic fluids," but as I understand it it implies a wide-spread, boundless dissemination of an infection. A serous, hemorrhagic, or purulent effusion is general when it is diffuse; therefore, when we say general peritonitis we have no use for the additional adjective *diffuse*.

The etiological classification of peritonitis places it as subsidiary to the primary lesion which produces it, and its practical import is its local origin. A painstaking investigation into the clinical history will usually determine the organ or structure primarily involved. The symptoms and physical signs, if the case is seen sufficiently early, will still further aid us in incriminating the part under suspicion. This valu-

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able diagnostic evidence does not conform to any stereotyped expression—the symptomatology of peritonitis is as varied as its causes. We cannot, by the presence of any striking symptom or group of symptoms, arrive at a decision in a doubtful case, but from the whole picture we form our conclusions.

GUNSHOT WOUNDS.

By W. E. Parker, M.D.,
New Orleans.

I had hoped to present to you some statistics to support some observations as to the effect of bullets during the late campaign in Cuba, but have been unable to obtain them. In reply to a letter to my late chief, Major and Surgeon L. A. LaGarde, who was chief surgeon at the Reserve Divisional Hospital at Siboney, I received a letter telling me that even at this late date there were no statistics in the Surgeon-General's office that would be of value, and that my own memory would probably be more accurate, so no accurate records can be presented. The cases on which my conclusions are based were seen on the hospital ship Olivette and at the Reserve Divisional or Base Hospital at Siboney. Surgery with troops in the field is a very different thing from surgery in civil life. At both of the hospitals, on shore and on the hospital ship Olivette, we were very short of surgeons, hospital corps men, nurses, and medical and surgical supplies. On the Olivette there was comparatively little surgery done, as the operating there was confined to those wounded at Las Guasimas. After this fight nearly all of those requiring operation were sent to the Reserve Divisional Hospital at Siboney. For each hospital there was supposed to have been a hospital company of one hundred and six men; but, as a matter of fact, I do not believe that either of the hospitals or the Olivette had a third of this number. Of these nearly all were recruits and knew nothing of nursing or assisting in operations. The number of surgeons was so limited that none of them could be spared to act as assistants during operations, so untrained help was

the rule rather than the exception. We were rushed off without any ambulances and with but few litters, so after the first fight, and the early part of the second, it was difficult to get the wounded back at all. As some of you may know, every regular soldier carries first aid packages containing gauze, bandages, and slings, and all are drilled in their use. This wise provision was of great assistance to us, as the wounds were, as a rule, in good condition when they reached us. It may be of interest to you to know that so far as can now be learned, there were but three primary amputations, all for shell injuries, and five secondary amputations, all of which were for gangrene, the result of wounded bloodvessels—a marked contrast to the results in the civil war. This result was probably due to better antiseptics and the small calibre of the Mauser bullet. The great drawback to the modern small-calibre bullet is that it does not stop a man unless it strikes so as to cause a fairly serious wound. I saw two men who were shot seven times before they stopped. For just such a reason the English had to resort to the so-called dum-dum bullet in India, and we would probably have had to have a lead-tipped bullet, too, if at war with a nation of an aggressive type. Generally speaking, the wounds caused by the Mauser and Krag-Jorgensen bullets were very similar except in the brain. Major Alfredo Garcia, the Spanish chief surgeon, through whose courtesy I was enabled to examine the Spanish wounded, told me that they had but one case of brain injury to live as long as three days. The Spaniards did not open any skulls and did not open any abdomens. I have not seen any figures as to Spanish losses,[1] so give you Major Garcia's figures. He told me that they had 675 wounded, 381 killed, and 213 missing and unaccounted for. I believe these figures to be correct. The Spaniards were in bad physical condition, and many died from their wounds.

I did not meet any surgeon who saw any of the so-called explosive effects of the small-calibre bullet, and there were

[1] Lieutenant-Colonel Howard, U. S. V., Chief Surgeon, has recently published some in the Journal of the American Medical Association.

almost no infected bullets. The Spanish sharpshooters used a brass-covered bullet fired from a Remington rifle, and at times the bullet would shuck its cover and an abscess form. Major Louis A. LaGarde, who was the chief surgeon at the Base Hospital, performed some experiments as to the relative penetrating powers of the Mauser, Krag-Jorgensen, and Springfield guns that were of decided interest. At a distance of three feet from the muzzle all three were fired into yellow-pine posts, one being put on the other. It was found that with ammunition of 1896 and 1897 the Mauser would penetrate a little more than thirty-four inches, and with that of 1895 would penetrate thirty-two inches. With our ammunition of the past year the Krag-Jorgensen would penetrate a fraction more than twenty-six inches, and the Springfield a little more than five inches. Yet we found a large number of lodged Mausers, and Major Garcia told me that they found but few lodged bullets. When I told him of our experiments, I asked him to explain the large number of lodged bullets found by us. His answer was that it was on account of the great distance at which they were shooting, which was no answer at all, as we were firing at the same range as they were.

Except with a few men who were prominent, or with some special case, it is impossible to say who operated, so I will speak of some cases that impressed me, some of which were operated upon by me and some by others, and draw some conclusions from the whole number of cases seen by me, no matter who the operator was. We were so pushed for time that no notes could be taken before operation and all were sent back to the United States as soon as possible after. This was necessary because we were short of nurses, cots, and almost everything that would have been conducive to the comforts of the men. Before entering into a discussion as to wounds of special regions, I wish to say a few words as to the surgeons of the regular army with whom I was thrown at Siboney. In addition to being splendid fellows, personally, they did their work as cleanly, quickly, and satisfactorily as

was possible under the circumstances; and no surgeon, volunteer or regular, faltered as to his duty whether at a hospital or on the firing line. Regimental surgeons and men of the hospital corps did specially commendable work.

Superficial and flesh wounds healed readily under one dressing if let alone, but some of the men came up to be dressed more frequently, thinking that they were neglected unless dressed at least every second day. In the few cases that did not heal the sloughing was only at the points of entrance and exit. I saw but two cases where clothing was carried into the wound. I now pass to wounds of special regions:

Wounds of the Head. Undoubtedly many men were killed outright or died within a few minutes as a result of wounds in this region. At the two hospitals probably thirty-five cases of cerebral injury were treated. From what I can learn, seven or eight died at the Field Hospital, and the rest of them were sent back to the Base Hospital. Three or four died there, but at least 50 per cent. of the remainder gave every reason for us to hope that they would recover at the time that they were sent back to the United States. Since my return I have heard of at least five who are still alive. At this time it is impossible to get any records, but it is possible that others are alive. Of the five cases of which I have heard, one was in a hospital in New York when I was there in September, and was doing very well. He had been shot in the region of the arm centre on the left side and was still paralyzed in his right arm. The other cases were recalled by Dr. H. R. Carter, of the United States Marine Hospital Service, who was on duty at the hospital at Fortress Monroe, and the details of the cases were given me by a member of the Thirty-third Michigan Hospital Corps, who was temporarily attached there. One of these cases was shot behind the left ear, the bullet coming out near the occiput. There was some dilatation of the pupil on the left side, and some confusion of ideas when he reached us. The wounds were enlarged at points of entrance and exit and spicula removed. His recovery was uneventful, and I am told that he is perfectly well.

A third case was shot in the left side of the forehead, the bullet passing directly back through the skull. Strange to say, he never presented any paralytic symptoms, but when he reached the hospital he was in a dazed condition. Fragments were removed and the wound dressed. The following morning I saw him sitting up smoking a cigarette, and he was apparently as rational as ever. I saw him at Montauk Point, and he was on duty with his regiment. It will be interesting to note the effects of cicatricial tissue here.

A fourth case, operated upon by Drs. Spier and Elliott, U. S. N., was the only one that I saw in which the bullet lodged. The wound of entrance was near the area centre on the left side. The bullet was found in the brain and removed and the wound packed with iodoform gauze. At the time of the last report he was still paralyzed in his right arm, but otherwise in good condition. The last case had a furrowed wound over the arm and leg centres of the left side. The wounds were enlarged and fragments removed. I was told that he was still without much motion on the right side. The method of procedure in all cases was to open the wounds and remove fragments. The surprisingly good results were probably due to the very small calibre of the bullet.

Wounds of the Spinal Cord. With the exception of one case these wounds were fatal. This one case was that of Edward Marshall, correspondent of the New York *Journal*. He was shot low down in the left lumbar region, causing a small lateral wound of the spinal cord. When he was brought to the hospital ship he had paralysis of both legs and of the bladder and rectum. The wound was enlarged and the fragments of bone that had been driven into the spinal cord and some clots were removed. On the second day he regained control of his bladder and rectum, and there was sensation on the outer side of the thigh. His improvement has been slow but sure, and when I saw him in New York he had perfect use of his right leg and partial use of the left, but I doubt if this improvement will continue, and he may require an amputation of the left leg. Generally speaking, I doubt the

value of operations for gunshot spinal injuries, but from the location of the wound and the small calibre of the bullet this seemed a specially favorable case.

Wounds of the abdomen did well without operative interference. Again I regret the absence of statistics, but there were about thirty such cases, with a mortality of about 50 per cent. No cases were operated upon at our hospital, but three were operated upon at the Field Hospital, and all died. It was said that the operator lacked experience in this line of work. While I have not in any way changed my views—well known to some of you—as to how these cases should be treated in civil life, when I saw the conditions I strongly advised against laparotomy. My reasons for this were the small calibre of the bullet, the difficulty in getting hot water, and the absence of trained assistants. Then, too, it is a good deal of a question if in the congested condition of an army hospital after a battle we would be justified in taking the time necessary for such an operation to the detriment of other wounded men. As illustrations of the cases that recovered I will cite two cases. Major T. T. Knox, First U. S. Cavalry, was shot in the right loin, the bullet coming out between the ninth and tenth ribs. He was brought to the hospital ship about five hours later. When seen his pulse was 130; he was in a cold, clammy sweat, and his urine was full of blood. He also complained of abdominal pains. His condition was such that he would have died on the table had he been laparotomized. Every three hours until the sweating was checked he was given strychnine sulph., grain one-fortieth, and atropine sulph., grain one-sixtieth, hypodermatically. At the end of about twenty-four hours he became quite tympanitic, but this subsided under full doses of magnesia sulphate. For four days his urine was of a chocolate color, and from the location of the wounds, he, in my opinion, undoubtedly had wounds of the liver and kidney. He recovered, and, I am glad to say, has been promoted.

The second case was Lieutenant Haskell, Rough Rider, who was shot in the left inguinal region, the bullet coming

out through the muscles of the right side, a little anterior to the kidney. He recovered without a rise of temperature. His intestines were undoubtedly wounded, but the prevalence of diarrhœa and the lack of food at the front served him and others in good stead.

In the long bones there was but little shattering, and it was not an uncommon thing to see a clean-cut wound without fracture. Wounds of the joints did well, and without complications. In one or two cases where there was much hemorrhage into the joint an incision was made and the clots turned out. There was not an amputation for joint injury.

After vessels were wounded the hemorrhage, except probably in the abdomen, was no greater than from other bullet wounds. We had to tie the brachial and femoral several times, and sent one case of wound of the subclavian back to New York, where he died after operation. Wounds of the chest did well after being sealed.

To sum up my conclusions I would say that:

1. The wounds of entrance and exit should be enlarged and drainage used for cerebral gunshot wounds, if the condition of the patient will permit.

2. Chest wounds should be cleansed and sealed and treated symptomatically.

3. Abdominal work should not be attempted in the field unless there are symptoms of hemorrhage.

4. For fractures the best splints can be made from plaster-of-Paris, and in those of the leg the Bavarian splint should be used. Drainage is seldom necessary.

5. Wounded joints should be cleansed and immobilized.

6. Wounded vessels should be tied as soon as possible.

7. Nerve suture should be done at once for wounded nerves

PENETRATING WOUNDS OF THE ABDOMEN, WITH REPORTS OF CASES.

By Floyd Willcox McRae, M.D.,
Atlanta, Ga.

At the Nashville meeting, in 1896, at the conclusion of the discussion of Dr. W. E. Parker's most excellent paper on "Penetrating Wounds of the Abdomen," the Association unanimously passed a resolution stating that it was the sense of the Association that in all cases of penetrating wounds of the abdomen it was the duty of the surgeon to make an exploratory incision, so as to definitely determine whether the viscera had been injured or not. Since then, however, a few able surgeons have dissented from this opinion. In the *Journal of the American Medical Association*, July 9, 1898, Dr. N. Senn, in an article on the "Modern Treatment of Gunshot Wounds in Military Surgery," says that a penetrating wound of the abdomen should never be probed either for diagnostic or therapeutic purposes. If any doubt exists as to whether or not the bullet has entered the abdominal cavity it is far better and safer to dilate the tract by the use of the knife, relying on the probe as a guide, than to work in the dark with the probe, and by so doing increase the possibilities of infecting the peritoneal cavity. He says that quite recently the assertion has been made by several prominent surgeons that laparotomy should be performed in all cases where it can be shown that penetration has occurred. It must, however, be admitted that, in the absence of serious visceral lesions, penetrating wounds of the abdomen are injuries from which patients are very likely to recover without operative treatment, and that when such patients are sub-

jected to laparotomy death may occur solely in consequence of the operation.

During the Greco-Turkish war several cases of gunshot wounds of the abdomen recovered under a conservative plan of treatment. In nearly all of these cases the bullet entered the abdomen above the umbilicus, the most favorable location for the escape of the intestines from the missile, the patient being in a standing position. In two out of sixteen cases of penetrating gunshot wound of the abdomen which came under the observation of Dr. Senn the absence of visceral injuries of the gastro-intestinal canal was demonstrated by the use of the hydrogen-gas test, and both of these patients recovered without resort to laparotomy.

Clinical experience and the result of experiment show conclusively that laparotomy should not be performed simply because the bullet has entered the abdominal cavity, but that its performance should be limited to the treatment of intra-abdominal lesions, which, without operative interference, would tend to destroy life.

If a gunshot wound has penetrated the abdominal cavity and the general symptoms and local signs lead to suspicion of the existence of dangerous internal hemorrhage, no time should be lost in further efforts to make an accurate anatomical diagnosis, as sufficient evidence has been obtained to warrant a laparotomy for the purpose of preventing death by the direct surgical treatment of the visceral injuries.

The propriety of surgical interference in cases of penetrating gunshot wounds of the abdomen will depend upon one of three things:

1. General condition of the patient.
2. Dangerous internal hemorrhage.
3. Wounds of the stomach or intestines large enough to permit extravasation.

Laparotomy in penetrating gunshot wounds of the abdomen is indicated in all cases where life is threatened by hemorrhage of visceral wounds and the general condition of the patient is such as to sustain the expectation that he will survive the

immediate effects of the operation. Tobias Nunez (*Medical Record*, September 25, 1897, p. 464), in a paper on "Penetrating Wounds of the Abdomen," points out how difficult it is to ascertain the true extent of wounds of this sort and the amount of damage done. The two great dangers are peritonitis and internal hemorrhage, the symptoms of which are well known. These complications might occur separately or together. If it is clear that the intestine is wounded, laparotomy is called for; but generally, if the indications do not call for radical measures, he leans to conservatism in treatment.

The opinions above expressed are so at variance with those of the majority of surgeons that I quote freely from a number of surgeons who have recently contributed papers on this subject to the various medical journals.

Dr. Randolph Winslow (*Annals of Surgery*, October, 1898) reports eight cases of penetrating gunshot wounds of the abdomen, with injury to the hollow viscera. He takes the position that the practice of opening the abdomen in all cases of penetrating wounds is now so fully recognized as being the proper procedure that one no longer has to defend himself from criticism or censure for the performance of this operation. On the contrary, says the author, a surgeon would be severely condemned if he allowed a patient to die after such an injury without attempting to rectify the damage by an operation.

The first case was gunshot wound of the small intestines; laparotomy; recovery. The second case, gunshot wound of the stomach; laparotomy; recovery. The third case, gunshot wound of the small intestines; laparotomy; death from peritonitis. The fourth case, gunshot wound of the abdomen; laparotomy; death. Case five, gunshot wound of the liver, small intestines, and mesocolon; laparotomy; recovery. Case six, gunshot wound of the small intestines; laparotomy; recovery. Case seven, gunshot wound of first portion of the duodenum; laparotomy; recovery. Case eight, gunshot wound of small intestines; laparotomy; death.

John Ward Cousins (*British Medical Journal*, July 16,

1898) reports a case of penetrating wound of the abdomen in which he resorted to immediate laparotomy, suture of the stomach, followed by recovery of the patient. He believes that in every case of penetrating wound where there is reason to suspect that an internal injury has been inflicted the abdomen ought to be opened with the intention of repairing the damage.

Budinger (*Langenbeck's Archiv f. klin. Chir.*) reports a very instructive case of a wound of the abdomen, made with a pocket-knife, in which there were no symptoms of intra-abdominal injury for a week from the time the wound was received, and then all the symptoms of perforation of one of the hollow viscera suddenly developed. When the patient was operated upon an incised wound of the stomach was found, and the abdominal cavity was in the condition we should suspect from such a perforation. It is a remarkable fact that the wound of the stomach should have remained closed tightly enough for a week to prevent leakage, although it was about 1½ c.m. in length, and that then, in consequence of a fit of coughing or from some such cause, should have been torn open.

George Tully Vaughn (*Medical News*, July 23, 1898) reports a case of gunshot wound of the abdomen, with ten intestinal perforations and twelve perforations of the mesentery. Laparotomy was performed and recovery followed. The patient was thirty-one years of age, and was shot in the abdomen with a pistol.

George Woolsey (*Annals of Surgery*, 1896, vol. xxiii. p. 423) relates a case of gunshot wound of the intestines, with sixteen perforations, in which he resorted to enterorrhaphy, with the use of the Murphy button, followed by recovery of the patient.

Mayo Robson (*British Medical Journal*, July 10, 1897) reports a case of perforating wound of the abdomen in which the superior mesenteric vein was wounded; the vein was ligated, lavage of abdomen was resorted to, also transfusion, followed by recovery of the patient.

M. Chauvel, in a paper before the Academy of Medicine of Paris, declares that in penetrating wounds of the abdomen made by knife or sword, as well as by revolver bullets, immediate laparotomy is generally indicated.

Michaux (*Surgical Society of Paris*) reports a case of penetrating wound of the abdomen produced by the explosion of a blank cartridge. The accident was caused by the careless handling of a Lebel rifle, the muzzle of the gun being very close to the skin at the time it went off. The result was a fracture of the left iliac crest and a perforating wound of the abdomen. The wound was enlarged and numerous pieces of pasteboard and cloth were removed from the muscular layers, but a careful examination showed no trace of a lesion of the intestine. The laceration of the perineum was closed and the external wound drained. Roberts, in the discussion, stated that experiments made by army surgeons showed that pasteboard wads in blank cartridges are projected with a rapidity of about 700 metres per second, and that the expansion of the gases is considerable. With a blank cartridge a person can blow a ragged hole in a pine board similar to that resulting from the use of dynamite. The danger of wounds of this description is very great at a distance less than 50 cm., and blank cartridges ought never to be fired at a distance of less than 2 metres.

Paul Klemm (*Annals of Surgery*, 1896, vol. xxiv. p. 662), in an article on the "Pathology and Treatment of Gunshot Wounds of the Abdomen," gives an able digest of the literature on this subject, the results of his own experiments upon dogs and the conclusions to be drawn from both of these. Up to the time of our Civil War but little effort was made to operate upon gunshot wounds of the abdomen. Since then much has been accomplished through experimental work and clinical observation to elucidate this subject. Klemm gives the statistics of various writers from Otis to the present time. In general, American and German surgeons advocate laparotomy as early as possible, while many of the French surgeons, led by Reclus, attempt to show that the expectant

method of treatment gives a far smaller percentage of mortality. This view is based upon the fact that after injury of a hollow viscus the perforation is tamponed by a plug of mucous membrane, which, by its prolapse into the wound, tampons the same. Reclus further taught that through contraction of the muscular coat of the gut the edges of the wound were approximated, and that the plasticity of the serous surfaces soon provided a closure. The former theory Klemm shows, by means of his experiments upon dogs, to be based upon inadequate knowledge. He found such a plug of mucosa, but also that it did not prevent a leakage of the intestinal contents when the slightest pressure was made. Two cases observed clinically by Sonnenburg and von Bergmann show the fallaciousness of Reclus's latter view. The results of Klemm's experiments upon dogs, thirty-two in number, coincide with those of Parkes and Schachner, viz., that, in the majority of gunshot wounds of the abdomen, viscera are injured. The clinic of Luhé, in 152 cases, shows that in only three was there no injury of the viscera. In animals local signs of perforation, such as prolapse of a viscus and shock, are rarely observed, whereas in human beings they are quite frequent. In the 152 clinical cases of Luhé there were perforations, most frequently multiple, in 110 cases. Local signs of injury were observed only eight times. General symptoms of shock of beginning peritonitis were far more frequent.

With this conflict of opinions and advice one would be at a loss to know just how to proceed in many cases. My own convictions, though based upon a comparatively limited experience, are very positive. I have for Dr. Senn personally the greatest admiration, and for his surgical opinions the most profound respect; but I should be recreant to my convictions were I to accept the proposition which he lays down in the foregoing. In most of the cases which have come under my observation where grave lesions of the abdominal viscera have existed the symptoms of internal injury were practically *nil*, and the positive signs of grave damage almost entirely absent.

In Cases XIII. and XIV. there was not a symptom that might not have been attributed wholly to the drunken state of the individuals and the excitement under which they labored. In Case XIII. the injury seemed so trivial and the wound of entrance so located that the house surgeon felt absolutely certain that no serious injury existed, and but for the fact of the patient's vomiting the bullet injury to the stomach would not have been suspected until too late to accomplish any good by an operation. The operation showed the stomach filled with the conglomeration of stuff which a drunken man will eat and drink; three perforations, with leakage of the gastric contents into the peritoneal cavity. It seems to me that without the operation the patient would have certainly died. In Case XIV. there were two penetrating stab wounds, with comparatively no shock; and still, on opening the abdomen, I found an incised wound of the left lobe of the liver, about an inch to an inch and a half in length, involving practically the whole depth of the organ, and bleeding with comparative freedom. A considerable quantity of blood was found in the peritoneal cavity. Hemorrhage was stopped by suturing, the cavity cleansed carefully, and the patient recovered promptly. This patient might possibly have gotten well without an operation, but my opinion is that without it he would have died. In Case XVII. there were numerous perforations in the intestine, the result of a 22-calibre rifle ball. The peritoneal cavity was filled with fecal matter, containing snap beans, green corn, etc. Eleven perforations in the small intestine were sutured and the ileum was resected. An end-to-end anastomosis was done with the Murphy button; but, in spite of saline infusion and the most active stimulation, the patient sank steadily and died about eighteen hours after the operation. Post mortem showed no leakage, either at points of suturing or resection.

Death in Case XVI. was certainly due to carelessness on the part of the house surgeon, who stitched up the abdominal wound with the omentum included between its lips, and when

Dr. Nicolson saw and operated on the case the next day peritonitis had already commenced. The omentum was resected, but death supervened as a result of general peritonitis.

Case II. would probably have been saved by prompt laparotomy with nephrectomy. In Case IV. the result might have been different had the colon with its mesentery been resected, as death was due in this case to the sloughing of the gut where it was separated from its mesentery.

The accompanying case-reports include: gunshot wounds of the abdomen, thirteen; operations, eleven; deaths, eight; recoveries, three; stab wounds, five; operations, four; recoveries, three; deaths, one. One case not operated upon recovered.

While they also show a large mortality, the six lives saved were certainly lives saved by prompt surgical interference, as they would most assuredly have died without operation. In my own cases, where recovery followed operation, I closed without drainage. The fatal case, much the most serious, I drained.

In conclusion, I wish to reiterate my firm conviction that every case of penetrating wound of the abdomen, where there is reasonable doubt as to injury of the abdominal viscera, should be subjected to at least an exploratory operation. This enables the surgeon to be absolutely sure that no injury has been done to the viscera or to repair as far as possible such injuries when they exist.

The mortality following the simple exploratory operation *per se* must be so small as not to weigh against the much greater mortality that must necessarily follow the expectant plan of treatment.

In the cases that I have seen the general and local signs have often been so misleading and enigmatical that prior to the operation a conclusion on my part as to internal conditions would have been practically a matter of guess-work.

Report of Cases from Records of Grady Hospital. Prepared by Dr. W. Hal Moncrief, Jr., Assistant.

Case I.—Richard W., aged eighteen years, a negro, hackman, admitted December 8, 1894, two hours after being shot with a 32-calibre pistol. Ball entered below the umbilicus, one to two inches to the left. Patient was well nourished, conscious; pulse 100, temperature 98½°. Probe would not follow the ball on account of the change in its direction. Laparotomy was performed by Dr. W. S. Armstrong. Incision was made over the wound and down through the abdominal wall, to ascertain if the ball had penetrated the cavity. This wound was closed and an incision, four to five inches long, made in the median line. A slight hemorrhage had taken place in the cavity. Intestines taken out, protected by hot towels, and examined carefully. Six perforations were found in the intestines and one in the mesentery. These were all closed, the abdomen flushed with hot water, and the abdominal wound closed. Patient stood the operation well. Pulse 100, temperature 98° after the operation. Morphine, ¼ gr., and atropine, $\frac{1}{150}$ grs., at night for the first week, to give quiet and sleep. Nothing but water allowed until December 17th, when broth was given. On December 21st stitches were removed and the wound found healed. On the 22d he passed one-half ounce of black matter from the rectum. First movement of bowels was on December 26th, from an enema, and these were repeated every other day. On January 3d one ounce of castor-oil was given, and the bowels moved daily after this. Temperature ranged from 98° to 100° for the first ten days, after which it was normal. Recovery uneventful.

Case II.—John I., negro, laborer, aged twenty-three years, admitted May 5, 1895, having been shot by a marshal a few hours before. Ball entered the right lumbar region and lodged beneath the skin between the ninth and tenth ribs. It was removed by a doctor in the town, twenty miles distant. On admission general condition fairly good, the two

openings above mentioned slightly suppurating. Complained of constant pain in the right lumbar region. Tongue coated, no appetite, and very weak; pulse 96, temperature 100⅕°. Urine acid, 1031, containing a considerable amount of blood, epithelium, numerous tube-casts, and a quantity of albumin. Phenacetine given when temperature rose above 102°. Bowels moved freely. Quinine, grs. iij., four or five times daily. Bladder was irrigated with saline solution twice daily, and on the 11th a considerable amount of blood was washed out. On the 12th, whiskey, 1 oz. every three hours, in milk, was given. Strychnine, $\frac{1}{30}$ gr., t. i. d., and fluid extract of ergot, ½ drachm, every three hours also; but on account of the increased amount of blood in the bladder nephrotomy was done by Dr. Elkin. The capsule was found distended with clots, which were removed and the cavity packed with gauze. Saline infusion; wound dressed daily. Patient became weaker, and the urine still contained much blood. Saline infusion (intravenous), and the pulse improved at once. Catheterized every three hours until the 14th, when he voided urine without the aid of the catheter. Urine still bloody. Packing removed on the 15th. Patient's temperature was 108¾°, and he complained of much pain near the region of the kidney, for which morphine, gr. ¼, was given as needed. Patient became weaker daily, was jaundiced and nauseated, vomited constantly, sank rapidly, and died on the 17th. Post-mortem examination: Intestines and omentum found black with blood and the abdominal cavity filled with dark blood. Right kidney three times the normal size, capsule adherent to the kidney substance, congested, and in a state of parenchymatous inflammation. Ball penetrated through the centre of the kidney, where it left a dark area, composed of broken-down and necrotic tissue, along its track. Liver showed a large abscess, containing several ounces of pus, adherent to diaphragm and anterior wall. Two large openings in the liver behind and one in front, in the line of the bullet—*i. e.*, about the lower third. Right ureter normal. Bladder normal. Gall-bladder much distended with bile.

Case III.—Robert J., negro, admitted August 21, 1895. While burglarizing was shot with a Winchester rifle. Brought to the hospital unconscious. Marked shock. Bullet hole two inches to the right of the umbilicus. Etherized and laparotomy performed by Dr. Nicolson. On opening the abdomen found the cæcum and part of the ascending colon torn in several places; large opening, two to three inches long. Fecal matter escaping into peritoneal cavity. Profuse hemorrhage. Intestinal openings closed with silk (Lembert) sutures; gauze drainage. Patient stimulated with whiskey, strychnine, and nitroglycerin without any effect, and he died twelve hours after operation.

Case IV.—Katie W., aged twenty-three years, teacher, single, admitted December 17, 1895. Was brought into the hospital a short time after being shot in the abdomen. Ball, entering in the left hypochondriac region and passing across, was found subcutaneously in the right lumbar region. On admission she was found in a condition of great shock, with pulse of 130, but her temperature was not taken. Patient was etherized and laparotomy performed. Two holes were found in the stomach, one being along the omental attachment of the omentum; these were closed. Ball struck the transverse colon at the attachment of the mesentery, tearing this loose and rupturing the gut for half an inch; this was closed. The cavity was then examined for other injuries, and hemorrhage was found coming from openings in the abdominal walls, which were closed. Patient was very fat, abdominal walls being about four and one-half inches thick, which necessitated a very long incision. Operation lasted about two hours. Pulse 150, temperature 100⅛°. Active stimulation was resorted to every three hours. Beef extract every three hours. December 21st, alum enema; effectual. December 23d, great distention of abdomen, with violent pain; enema, etc., not effectual. Patient gradually grew weaker, and death resulted, with a temperature of 105°, on the 26th. Autopsy: Perforations in stomach, uniting slough along junction of mesentery one and one-half inches. General peritonitis.

CASE V.—Henry P., aged thirty-nine years, colored, driver, admitted January 25, 1896. Patient was stabbed in the right side, between the tenth and eleventh ribs, a short while before admission, the wound penetrating the abdominal cavity; also had an incised and lacerated wound on the right side of the face, these injuries being small. On admission a piece of omentum was found protruding from the wound. No shock; some hemorrhage. Treatment: Wound enlarged, omentum returned, closed, and dressed antiseptically. On the day following the temperature reached 103°, accompanied by no pain or discomfort. Temperature continued from 101° to 104°; wound examined and found clean. Bowels restrained for five days, when one ounce of castor-oil was given, with good results. January 25th, slight dulness found over the lower portion of the right lung, with subcrepitant râles on auscultation. January 26th, bronchovesicular breathing and dulness on percussion, with characteristic rusty sputa. Quinine, grs. iv., four times daily, and whiskey, ½ oz., four times daily. Hospital cough-mixture, 1 drachm, four times daily. Crisis on January 29th. Resolution complete February 6th. Wound healed permanently, and he was discharged, cured, on February 7th.

CASE VI.—Cancy R., aged eighteen years, negro, wagoner, admitted March 31, 1896, having received a gunshot wound of the left side, on a line with the crest of the ilium, about two to two and one-half inches from the spinal column. On admission very little shock or hemorrhage. Tenderness over the abdomen, especially at the umbilicus; some nausea; urine regular. Treatment: Wound dressed antiseptically and with collodion. Rest in bed, milk, and broth; enema; no blood in the stools; sulphonal, grs. xv., at 8 and 10 P.M. for sleep. Hot stupes for distention of the abdomen. Tenderness over the abdomen. Temperature 101° on the second day, gradually coming down. Stupes omitted on April 5th, and he rapidly improved after the fifth day, and was discharged, cured, on April 15th.

CASE VII.—Annie J., colored, aged twenty years, admitted

on January 2, 1897. A short time before admission she was shot twice in the chest and once in the abdomen—one in each lung and one in the left hypochondriac region. In a condition of profound shock. Pulse 140, temperature 97⅘°. Strychnine, gr. $\frac{1}{30}$, and morphine, gr. ¼ p. r. n., for quiet. Died on June 3d.

Case VIII.—W. A. H., white, aged twenty-one years, druggist, admitted June 16, 1897. Was shot in the back just at the crest of the ilium, on right side, a short time before admission. Not much hemorrhage. Pulse 60, temperature 98°. Laparotomy by Dr. Cooper, and three perforations in the intestines and two in the mesentery sutured. Strychnine every three hours. On the 17th alum enema, ½ gal., and calomel, grs. v., repeated in two hours. On the 18th, salts, ½ ounce, at 5 A.M., followed by alum enema. Sank steadily all day, and died about 9 P.M.

Case XIV.—Reuben H., colored, aged sixteen years, admitted June 21, 1897. A short time before admission he received a pistol-shot wound; entrance in the back, opposite the first lumbar vertebra on the left, bullet coursing upward, and point of exit in front and just to the right of the ensiform cartilage. Laparotomy by Dr. Elkin. Found wound through the left lobe of the liver, one wound in the stomach, six perforations in the intestines, and four in the mesentery. Stomach and intestinal wounds closed by Lembert's sutures and wound in the liver packed. Strychnine, gr. $\frac{1}{30}$, every four hours. On the 22d morphine, gr. ⅙, calomel, grs. v., at 8 P.M., and 5 A.M. on the 23d, followed by alum enema and later by soapsuds enema. Milk-punch four times daily. Morphine, grs. ¼, at 8 P.M. On the 24th, alum enema; salts, ½ oz.; morphine, gr. ⅙; whiskey, ½ oz., once every three hours. Sweet milk, 3 oz., and chicken-broth, 4 oz., to alternate every three hours. On the 26th, alum enema. On the 27th, strychnine, gr. $\frac{1}{30}$, every three hours, but sank, and died in the afternoon.

Case X.—George D., colored, aged eighteen years, laborer, admitted August 18, 1897. About eight hours before admis-

sion was stabbed in the umbilical region, to the left of the median line. Six hours after being wounded he vomited a considerable amount of blood. No shock on admission. Pulse 98, temperature 98⅖°. Treatment: Liquid peptonoids, 2 oz., per rectum, every three hours. Saline enema as necessary for thirst. On the 22d, rectal feeding omitted, and peptonoids, 1 oz., given by the mouth. Discharged, cured, on August 31st.

Case XI.—John T., colored, aged twenty-two years, porter. Was shot with a 38-calibre pistol on the night preceding his admission. When admitted there was no apparent shock; pulse 90, temperature 98°; robust condition. Wound of entrance about two inches above and to the right of the umbilicus. Laparotomy by Dr. Cooper on the morning of July 30th. Five perforations found in the ascending colon just above the cæcum, the fecal matter having exuded into the peritoneal cavity. Numbers of contused spots on the intestines. Perforations closed by Lembert's sutures. Abdominal cavity washed out, rubber drainage-tube used, and wound partially closed. Dressed antiseptically. On the day after operation patient suffered intensely with distention of the abdomen in the region of the stomach. Vomited red, bloody-looking fluid, with fecal odor. Drainage-tube removed and abdomen washed out with hot, sterilized water, and soda bicarb., grs. xx.; aquæ menthæ pih., ½ oz., mixed, given for accumulation of gas in the stomach. Death on the third day, with symptoms of perforation. No post mortem.

Case XII.—Will T., colored, aged twenty-seven years, admitted November 7, 1897. A short time before admission he was stabbed below and a little to the right of the umbilicus; also in the upper part of both lungs and in the back. Exploratory laparotomy done by Dr. Reid. No injury to viscera. Treatment: Strychnine, gr. $\frac{1}{30}$, every three hours, and saline enema, Oj. On the 8th, salts, ½ oz., followed by enema. Discharged, cured, on November 26th.

Case XIII.—C. E. C., white, aged twenty-one years, admitted February 23, 1898. Just before admission received

a pistol (32-calibre) wound just one inch within the left nipple. Bullet vomited one hour later. When admitted, still under the influence of whiskey, not much shock, almost normal pulse, abdominal muscles tense. Laparotomy by Dr. McRae; three perforations in stomach closed. Strychnine, gr. $\frac{1}{30}$, every three hours. Whiskey, $\frac{1}{2}$ oz.; panopepton, 1 oz., and saline solution, 4 oz., every three hours, per rectum. On the 26th whiskey, panopepton, and saline omitted. Bowels kept open and wound dressed as necessary. Discharged, cured, on March 7th.

Case XIV.—Frank C. R., white, aged twenty-five years, admitted March 13th at 2 A.M. About one-half hour before admission he was stabbed twice in the epigastrium. The first was directed straight upward and penetrated the left lobe of the liver, and the second barely entered the peritoneal cavity. General condition good. Laparotomy by Dr. McRae at 4 A.M. Liver wounds sutured. Morphine, $\frac{1}{4}$ gr. given for quiet. On the 4th, salts, 1 oz., at 5 A.M., and followed by alum enema. On the 15th enema in the morning. Hospital cough-mixture given for cough. On the 16th the enema was repeated. On the 18th, terebene, 10 drops, with cough-mixture. Bowels kept open with salts, oil, and enema. Discharged, cured, on April 6th.

Case XV.—John C., colored, aged thirty years, admitted April 22, 1898, at about 6 A.M., patient having been shot about thirty minutes before. Ball entered about one and three-quarter inches to the left of the spinal column, and emerged in front, about one and one-half inches below the ensiform cartilage in the epigastrium, slightly to the right of the median line. Considerable shock and profuse hemorrhage. Did not rally, but gradually grew weaker until the operation, at 9 A.M. Laparotomy by Drs. Nicolson and McRae. No wounds of abdominal viscera found except one passing through the pancreas, from which the hemorrhage seemed to come. Efforts were made to stop the hemorrhage by packing the wound in the pancreas, and down through the muscular structure of the back, with iodoform gauze. Patient

came very near dying on the table, but revived on vigorous use of stimulants and saline infusion. These were continued at intervals for the next thirty-six hours, and the pulse became good for a time, but gradually grew weaker, and death ensued at 9 P.M. on the 23d.

CASE XVI.—Joe T., colored, aged ten years, schoolboy, admitted midnight of July 2d, 1898, having been stabbed just above the costal margin in the mid-axillary line, on the left side, the knife wound being large enough to admit the finger, and ranging downward and inward. No shock on admission, but he complained of great fulness and tenderness over the stomach. Operation by Dr. Nicolson at 3 P.M., July 3d, under chloroform. Incision at the outer margin of the rectus muscle, about three and one-half inches long, and another incision, two inches long, at right angles to this. Wound was found to extend through the diaphragm from above, wounding the omentum, which was found protruding and strangulated and a general peritonitis beginning. Two wounded portions of the omentum were ligated and removed. Incisions closed with silkworm-gut and sterilized gauze drain left through the knife wound. No blood in the cavity. He reacted at about 8 P.M., but was still very weak, with a pulse of 136, temperature 99⅕°. Was very restless, but passed the night fairly well, sleeping at short intervals. Some distention next morning about 9 (July 4th), for which alum enema was given. Rectal tube was used, but distention was still marked. Salts were given, but vomited immediately. Strychnine, grs. $\frac{1}{30}$, and whiskey, 1 drachm, were given every three hours. Castor-oil, alum, and sweet-oil enemata were given, but all to no avail; distention increased, pulse became weaker and weaker, and patient finally died at 6.30 A.M. on July 5th.

CASE XVII.—Thomas J., white, aged fifty years, admitted September 7, 1898. Ball entered just below umbilicus, a little to the left. Patient fairly well nourished, conscious. Pulse 100, temperature 98°. Surface of abdomen red and excoriated from application of liniment containing a large quantity of capsicum, camphor, and kerosene. This lini-

ment had also been put into the cavity through a funnel. Operation by Dr. McRae four hours after receipt of injury. The peritoneal cavity was filled with fecal matter and partially digested food of all kinds, the whole peritoneal surface red and irritated from the contents of the bowels and the liniment. Stomach and intestines full of digested and partially digested food and fecal matter. Eleven perforations in the small intestine were closed with interrupted Lembert sutures, and two perforations along the mesenteric border required a resection of the ileum and an end-to-end anastomosis with the Murphy button. Patient rallied somewhat from the operation, but gradually lost ground and died eighteen hours afterward. Post-mortem examination showed no leakage either at points of suturing or resection.

THE PRACTICAL MANAGEMENT OF BULLET WOUNDS OF THE ABDOMINAL VISCERA.

By H. Horace Grant, M.D.,
Louisville, Ky.

In great part the disputed points in wounds of this variety have been so agreed upon and settled that the subject is now far less frequently referred to in journals than was the case a few years ago.

Observation and experience with the operators coming frequently in contact with this lesion have determined that penetrating wounds of the abdomen demand laparotomy at the earliest possible moment after diagnosis and thorough inspection of the entire region endangered. It is established that not only is the mortality in untreated wounds of the abodmen almost 100 per cent. where the intestines are perforated, and very high in wounds of the solid viscera, but it becomes less promising every advancing hour until, by the second day, peritonitis has set in and destroyed the hopefulness of the prospect. Klemm[1] has collected one hundred and fifty-two cases of penetrating wounds, in only three of which all of the viscera escaped, with one hundred and ten instances of intestinal perforation. The great majority of these, if untreated, die of the immediate effects of the injury, practically all those with intestinal perforation; but even those escaping death from hemorrhage from solid viscera, according to Klemm and Wagner,[2] die eventually of septic infection or later abscess.

Statistics. Thus, as practical surgeons, we look upon the prognosis of untreated penetrating wounds of the abdomen thus:

[1] Annals of Surgery, November, 1896. [2] Loc. cit.

The intestines will be penetrated in 73.2 per cent. of all cases injured, of whom all will die. The solid viscera or intestines will be injured in 99.8 per cent. of all injured, and to a very large number of them death will come in a few days, to most if not all of the remainder in a few weeks.

On the other hand, Parker has shown in his classical résumé of the subject that the mortality in complicated wounds of the solid viscera treated by laparotomy is 61.6 per cent., while of those involving the intestines, or both the solid and hollow viscera (these taken together in the collection), it is about the same, 62 per cent. But Parker further demonstrates from statistics that when laparotomy is done for wounds of hollow viscera within seven hours of injury the mortality is only 47 per cent. If postponed the percentage rises as the time after injury before the operation is prolonged. These facts, every item of which represents human life, established, the practical importance to be derived from them lies in the line of prompt and thorough surgery. Clearly it is never too early to determine if a gunshot wound of the abdomen has penetrated the cavity; if it has done so no minute must be lost, if it is not too late already.

From the table of Parker the favorable prospect declines very fast after the interval from seven to fourteen hours, and becomes only a remote hope after twenty-four hours, as his table contains no record of recovery from intestinal perforation operated on after twenty-four hours, though two cases of wounds of the solid viscera are recorded. In the October number of the *Annals of Surgery*, Winslow, of Baltimore, reports eight cases, in all of which the hollow viscera was perforated; in one case, which recovered, was a complicating wound of the liver; of these eight cases, five recovered; of the three perishing, in two additional perforations were overlooked, thus practically reducing the mortality to one death in six operations. All these operations were done within the fourteen-hour limit, only one having passed seven hours.

Within the past two years I have operated on four cases

(reported hereinafter). In each case the patient was seen early, in no instance later than four hours. In three, resection of the intestine was necessary. Three of these patients recovered; the fourth died from septic peritonitis due to the escape of a large quantity of fecal matter before the operation. The autopsy disclosed a perfect intestine.

Diagnosis. There is little to be said of the symptoms of perforation, for there is none of any value in the face of the facts just adduced. Shock, pallor, vomiting, severe pain, may all be absent until fatal hemorrhage has occurred, or may result from fright. In most, perhaps in nearly all, there are tenderness and pain referred to the umbilicus, constant and increasing in severity; the physical signs of hemorrhage externally, and escape of fecal matter must be rare. I have never seen enough external hemorrhage to count for anything, nor even any escape of intestinal gas, still less feces, nor have I noticed in the report of cases reference to such sign that I can now recall.

Treatment. With these facts before us it is clear that to delay in a delusive hope, until peritonitis shows its folly, is almost a crime. The practical management of a suspected penetrating wound is as plain duty as the tying of a bleeding artery. As soon as possible after injury the patient is to be transported to a suitable place and under usual precautions; after all preparations are made for laparotomy and repair of lesions, an experienced hand should carefully trace the course of the ball into the cavity, if it goes there. This is easy enough when the penetration is direct from the abdominal wall, but often difficult or impossible when from behind or from the thoracic or pelvic cavities. Under these latter circumstances the history of the case, the direction of the projectile, and the general symptoms must be the only guide. When the penetration is made out there arises the all-important question of:

Technique. Three principal dangers threaten after the operation—overlooked perforations, unchecked hemorrhage, septic infection from any cause.

The first incision in the median line, unless for some special indication, should be short—three inches.

Perforations. If on opening the peritoneum there be no indications of considerable hemorrhage, the intestine is passed through the fingers until a damaged portion is found. After suture of the perforation the repaired portion is anchored by a strand of gauze and search made as before to the colon, thence along it. When one end is thus searched, traction on the gauze will mark the point to begin searching to opposite end and the direction to follow.

In my experience the perforations have all been within a few feet of each other, and usually a careful following of the gut five feet in either direction will relieve anxiety about other perforations, though, unless the direction of the ball is clearly defined, the entire tract endangered should be searched. If there is any reason to fear for the stomach it should be inspected.

The location and size of the perforation will determine the advisability of resection.

Hemorrhage. If on opening the abdomen indications of hemorrhage are present, the wound should be so enlarged as to enable exploration of the liver, kidney, and spleen, controlled by the direction seemingly taken by the ball and the lesions presented; but the incision should be free and the hemorrhage controlled before search is made for perforations. Suture for liver, kidney, spleen wounds, where feasible, is best. The best material for suture seems to be silk. Packing for unmanageable liver, or spleen wounds, is to be employed, while persistent bleeding of the kidney indicates extirpation.

Lastly, *sepsis* is due most commonly to escaped fecal matter, occasionally to injudicious probing, or some accident at the operation. When the patient, as is very often the case, has been drinking and eating freely previous to the injury, the small intestines are full of fluid matter, which escapes from the distended walls and gravitates to the bottom of the pelvis.

Incision of Intestine. Here *thorough irrigation* is the im-

perative obligation. Here, too, if the intestines are distended with fluid feces rather than gas, the propriety of attempting to empty them is, I think, established; much better is it to carefully open the intestine and empty it, difficult as it is, than to imperfectly clean the cavity. The first is risky, the latter certain death. If a resection is required, the intestines may be emptied through the divided ends with more facility.

I would be understood as opposed to incision, emptying, or washing out the intestines except when the distention with fluid feces indicates a probable overflow into the cavity, and the bulk of which prevents thorough irrigation.

Evisceration of the full intestines should not be undertaken. They should be emptied first, if so distended; and in order to reach bleeding points or to certainly clean a foul cavity, evisceration is sometimes allowable.

Drainage is required in cases which are much handled, when there is risk of hemorrhage or probability of sepsis. The ordinary rules of after-treatment for laparotomy control.

I report the following:

Case I.—1876. Male, twenty-two years old; pistol-ball wound to right of umbilicus; abdomen opened two hours after injury; pulse 100. A large, ragged wound of the ileum, just beyond the mesenteric border, presented, with free hemorrhage. Attempt was made to close the wound, but it appearing to encroach on the lumen too much for safety, and search revealing a second wound larger than the first, about sixteen inches further along the gut, the suture was abandoned. No other injury was found, and it being clear that resection must be done, twenty inches were removed, including both wounds, and end-to-end suture was made, much after Wolfler's method. The patient was put to bed in the City Hospital under the care of Dr. Turner. He recovered without interruption, and was exhibited before the Louisville Surgical Society, and the case is reported in their published minutes.

Case II.—Male, colored, aged twenty-eight years. Operated on in May, 1895, and reported also to the Surgical

Society. Four hours after pistol-shot wound in the abdomen I made a section and found three penetrating wounds of the ileum and four of the mesentery, with extensive external hemorrhage. These wounds were closed by silk suture and a drainage-tube put in. The patient was also in the City Hospital. He recovered without event.

Case III.—1898. Female, colored, aged thirty-one years. Seen about one hour and a half after injury. Pistol ball one inch to the left and on a level with the umbilicus. A second bullet had penetrated the right shoulder, but the bone seemed uninjured. Shock was slight. Immediate laparotomy at the Auxiliary Hospital (colored), with Drs. Asman and Heflin and Dr. Fitzbutler, Jr., of the hospital, assisting.

Five inches of small intestine required resection; union made with Murphy button. Two other perforations were sutured. Recovery was without event.

Case IV.—1898. Male, white, aged about thirty years, very robust; seen with Dr. Turner two hours after injury, which was inflicted in a bar-room fight. Penetrating wound very near umbilicus. Intestines very full of fluid feces, and abdominal wall very resisting. Two bleeding vessels in the mesentery were secured and five inches of intestine removed; union with Murphy button. There was much shock. Irrigation was made as thoroughly as possible, but it was almost impossible to close the wound over the distended viscera. Drainage-tube was put in. The patient died of peritonitis in about thirty hours. At the autopsy the button was found intact; there were no other perforations nor evidence of hemorrhage. The serum in the bottom of the pelvis had a fecal odor, and the extravasation undoubtedly caused the fatal peritonitis. I regret the intestines were not emptied and perhaps even lifted out of the cavity.

I report in this connection two cases operated on very recently by Dr. Vance, of Louisville, who kindly furnished me them:

Case I.—Dr. C. C. Godshaw, who was shot by a negro in

1898, and upon whom I performed a laparotomy within an hour after the receipt of the injury, is before us to-night to show the result. I had also hoped to have present a boy who was also shot in the early part of November and operated upon six hours later, in order that the two cases might be shown together.

I will read a written report of the two cases prepared about five weeks after the first operation was performed. In Dr. Godshaw's case there has been, as you will observe, a perfect result, and he states that he feels as well as he ever did in his life.

October 30, 1898, Dr. C. C. Godshaw, aged forty-four years, was shot with a 32-calibre revolver at 2 o'clock P.M. The weapon was held very near his body, burning his vest. The bullet entered the abdomen two and a half inches above the umbilicus and one and one-half inches to the left of the median line. I found him a few minutes afterward lying on a sofa, he having walked about one hundred feet after being shot. He did not fall. Dr. Jones gave him $\frac{1}{30}$ gr. strychnine and $\frac{1}{150}$ gr. atropine, as shock was very apparent.

He was removed immediately to St. Joseph's Infirmary, and within an hour after the wound was received I opened the abdomen, the incision being made to the left of the median line, with the bullet wound at its centre. The patient's idea that the man who shot him was to his right made me choose this incision. After carefully reading the small intestine and examining the colon as well as possible, finding no wounds, the incision was continued up to the ensiform cartilage and across the median line, as the wound made by the bullet was discovered to be from left to right.

In the stomach was found one bullet wound, which was carefully closed with No. 1 plain catgut, interrupted Lembert sutures being used, braced afterward with a continued Lembert suture. Further injury of the stomach was sought for, but not found. Quite a quantity of blood-clots came from under the liver. Further search discovered a long wound near the lower border of the duodenum, three inches below

the pylorus, evidently a wound of exit, much lacerated, with the peritoneal covering seemingly lost for quite an extent around. This was carefully closed by Lembert interrupted sutures through muscular and submucous coats, the lesser omentum being reflected over the gut where the serosa was lacking.

The jejunum was much distended with blood, and the bullet had evidently barked it in its passage, one point showing loss of peritoneum and slight bleeding. Every effort to repair this seemed to make matters worse, and it was finally left. The great distention by blood rendered suturing impossible.

No other wounds were found. Irrigation with normal salt solution soon removed remaining clots with some pieces of clothing, which came from back of the liver.

The abdomen was closed with interrupted silkworm-gut sutures, a glass as well as a gauze drain being placed between the stomach and liver back to the posterior abdominal wall; the gauze was covered with rubber tissue. The glass tube was removed at the end of fourteen hours, the gauze at the end of twenty-four hours, some distress of respiration being caused by their presence.

The patient returned to his home on the fifteenth day, having had no bad symptom nor a single dose of medicine after coming off the table. He vomited once, sixteen hours after the operation, a quantity of old blood. He had eaten a hearty dinner one hour before being shot, the stomach being partially filled with food and greatly distended with gas; the latter was allowed to escape before closing the wound. The bullet evidently left the stomach by the pyloric opening.

There has been no trouble, and now, at the end of five weeks, the patient has returned to the practice of medicine, having been up and about each day since his return home.

Case II.—W. C., aged thirteen years, was shot with a Flobert rifle bullet at 8 o'clock A.M., November 18, 1898, just after eating a full breakfast. The gun was in his own hands, and he had just been looking into the muzzle; it was

loaded with a 22 long cartridge. Just as he lowered it it was discharged, the bullet striking him midway between the umbilicus and tip of the sternum, one-half inch to the left of the median line. He immediately vomited the recent meal along with a great deal of blood. Six hours afterward I found him with great evidence of shock and loss of blood; pale, lips blue, pulse 130, feet and hands cold.

The mother consented to an operation, though the desperate chances were fully explained. Without loss of time, with the cottage kitchen as an operating-room, the abdomen was opened between the umbilicus and sternum, the bullet wound being about the centre of the incision. As the peritoneum was opened fluid blood escaped in quantities, and the cavity seemed filled with clots. The history of his having vomited blood made me seek the stomach first. A large wound was found about the middle of the anterior wall, evidently the bullet having bitten out a piece and continued on downward, as proven by the further exploration. This wound was closed with No. 1 plain catgut. No wound of exit in the stomach could be found. There was a buttonhole wound through the edge of the left lobe of the liver, which was not bleeding. There was no wound of the colon. Reading of the ileum was then done, the blood and clots being removed as we progressed, constant douching being employed by a small pitcher. About three feet above the cæcum three wounds of entrance and three of exit were found and carefully sutured as they appeared. The wounds of exit were large and ragged. Two wounds of the mesentery near the gut were also cared for. One of these had severed a large artery, which was bleeding actively and evidently had supplied most of the blood found in the cavity. The great omentum had three or four dermatomæ produced by the small bullet having grazed or passed through its meshes.

By this time the boy was in a pretty bad shape, and the wound was closed rapidly, with large gauze drain wrapped in rubber tissue inserted at the upper angle. The drain was removed at the end of twenty-four hours, and after starving

for three days and being supported actively with strychnine and nitroglycerin this boy is about well at the end of sixteen days, the only mishap being that the night after the stitches were removed he tore the wound open; being a rather unruly chap, I think he undertook to scratch too vigorously.

I had no idea when I finished this work but that the boy would die promptly. This should encourage us to try almost any case. This is my seventh operation and third recovery after extensive gunshot wounds of the stomach or intestines. A large abscess of the abdominal wall subsequently formed and discharged at the lower angle of the wound.

In this last case Dr. Garey, of New Albany, Ind., was the attending physician, Drs. Easley, Harris, and McIntyre, of the same place, being present.

DISCUSSION.

Dr. H. H. Grant, of Louisville.—Mr. President: Some of the statements made by Dr. Parker are unquestionably astonishing. A number of his conclusions, perhaps the majority of them, we are all prepared to accept without any hesitation. Of course, we make allowance for the different surroundings on the field of battle as compared with those in civil life. We also make allowance for the fact that many of these patients are men of fine physique, who have perhaps been free from illness, and have better natural powers for withstanding injuries than we see in civil life.

As to the treatment of chest wounds, it is doubtless agreed by most conservative surgeons that the best plan is to clean them, seal them up, and allow them to go unexplored unless there is evidence of troublesome hemorrhage or septic infection either of the lung or of the pleura.

With reference to the management of brain injuries and wounds of the spinal cord, there is likely to be very little difference of opinion between Dr. Parker and most surgeons. Injuries of the abdominal cavity we treat in an entirely different manner from the suggestions he makes, and a very important contribution to

that plan of treatment comes from the distinguished essayist himself, and for this reason we are naturally somewhat startled at the statement that he finds fully 50 per cent. of recoveries after injuries of the abdominal cavity where there is a probability, if not a certainty, of penetration of the peritoneal cavity and probably of the intestine. It is a well-ascertained fact that in nearly every instance of gunshot wounds of the abdominal cavity in civil life either the intestines or the solid viscera are penetrated; in fact, either one or the other or both will be found to be penetrated in nearly 100 per cent. of the cases, according to the statistics adduced by Dr. Parker himself. If this is a fact some explanation must be made of the escape of these patients. That explanation may be that either hunger or diarrhœa leave the intestinal canal so empty that it could not be wounded by a bullet, or that the bullet is so small as not to make a sufficient wound of entrance to allow the extravasation of the contents. Without any experience whatever with cases of this kind in military surgery, I should be disposed to look upon the statistics of the report presented by him in this respect as incomplete, inasmuch as it does not appear that any of these wounds are demonstrated to have penetrated the peritoneal cavity, and in the single instance which he reported, in which penetration was highly probable, or which he declared to be a fact, the point of injury was not such as to have necessarily injured any of the solid viscera, and possibly not to have damaged the bladder, the small intestine, or the colon. It is, as I have said before, universally believed that injuries penetrating the bladder intraperitoneally or the small intestine will result certainly in death if surgical interference is not resorted to. Injuries involving the solid viscera are likely to produce fatal results from immediate hemorrhage, but those cases in which immediate hemorrhage does not cause death, septic infection eventually carries off the patient in a large proportion of cases. Some explanation should be forthcoming either to explain that the viscera were not injured, that the intestines were not perforated, or else we may modify our prognosis in the case of perforation in the abdominal cavity from gunshot wounds. There does not appear to be any clear reason why a man who is a soldier should escape fatal results from fatal (?) injuries any more than a man who remains at home: and as the great majority of us are disposed to remain at home

whenever there is a war, unless an additional means of safety is provided where gunshot wounds are frequent we may as well rush off to the war after this assurance of safety that we draw from the Doctor's paper.

Dr. W. E. Campbell, of Knoxville, Tenn.—I would like to ask Dr. Parker as to the mental condition of the patient who was injured through the forehead.

Dr. Parker.—He was perfectly conscious. There was no paralysis.

Dr. Campbell.—Did his intellect remain good?

Dr. Parker.—Yes; but he had a slightly dazed condition.

Dr. W. L. Robinson, of Danville, Va.—I would like to ask Dr. Parker if, in the light of the facts he has given us, he would pursue the same course in private practice of non-interference in gunshot wounds of the abdomen. I have had the opportunity of seeing a good many cases of gunshot wounds in the town where I live, and without exception all gunshot wounds of the abdomen have ended fatally. The conditions and surroundings may have had something to do with the results on the battle-field, but those conditions do not prevail in private practice except very rarely. We find, as a rule, the intestines filled with feces and the peritoneum soiled for hours before operative intervention.

Dr. George S. Brown, of Birmingham, Ala.—According to the recent statistics collected by Dr. Senn, of Chicago, he comes to the conclusion, if I remember rightly, that 80 per cent. of the cases die with operation and 65 per cent. without operation. While I have not been in the army during the last ten years, I have seen many cases of gunshot wounds of the abdomen in civil life. I have no doubt but that there have been several hundred gunshot wounds of the abdomen, probably a thousand, in the last ten or twelve years in Birmingham, Ala., and the surrounding districts. I know of at least fifteen cases of penetrating gunshot wounds of the abdomen that have recovered without operation, and in many of them there were unmistakable signs of perforation, as evidenced by peritonitis and fecal fistula. I recall but one case now that recovered with operation, and I am reasonably certain that at least forty operations have been performed. In the case that recovered no perforation was found at the operation, although there was a good deal of blood in the

abdominal cavity. Personally, I have had five cases, and the one case that recovered had no perforation of the intestine. I remember one case that was badly neglected. The man was shot with a load of buckshot at a distance of about ten steps, both barrels being discharged. At the time I saw him, six weeks afterward, there were two fecal fistulæ and a urinary fistula. There were numerous scars over the abdomen, scrotum, and thighs, the results of the bullet wounds which had healed. The man was then convalescent. I remember a case, recently reported in Birmingham, of general peritonitis following a gunshot injury, in which there was an uninterrupted recovery without operation. This case happened within the last six weeks. In my five cases two had no perforation of the intestine. I think several others which had no perforation have been operated on by other surgeons.

I certainly think the diarrhœa and starvation had something to do with the results reported by Dr. Parker, because we all know that the intestines are more liable to injury when they are full. There is one point to be remembered, and that is, many cases are recorded as deaths without operation that are dying when seen. It is the more favorable cases that are operated on, and this would make still a wider difference in the statistics.

Dr. William E. Parker, of New Orleans, La.—The discussion so far seems to have been directed to what I had to say with reference to abdominal wounds, and I do not wish to steal the thunder of Drs. McRae and Grant on that subject. If any of the members want to discuss any other section of the paper I would be glad to have them do so. The discussion on gunshot wounds of the abdomen should come up with the other two papers. If you will allow me, Mr. President, I will answer the remarks of Dr. Grant now as well as those of Dr. Robinson. If they had listened attentively to my paper they would have heard me state distinctly that I have not changed my views as to how these cases should be treated in civil life. In fact, if anything, I am more convinced than ever that laparotomy is the first thing to do. When laparotomies are done promptly by men who are accustomed to do abdominal work the mortality from gunshot wounds should be considerably less than 50 per cent. I am speaking now of laparotomy in early cases. In my paper I spoke of what should be done on the battle-field. There we had a small calibre bullet.

We all know that a small calibre bullet does not cause as much damage as a larger bullet. It is an easy matter for the mucous membrane of the bowel to throw itself out, as it does do, and with a small calibre bullet extravasation is frequently prevented. The percentage of recoveries would not be as large were it not for the small calibre bullet. But, taking the general conditions as we found them on the battle-field with the small calibre bullet—and all nations are now using small calibre bullets—with the difficulty that exists of getting sterilized water and good assistants, I believe the percentage of recoveries without operation will be greater than with it. But in civil life I am more strongly convinced than ever that the proper thing to do is to laparotomize.

As to what Dr. Grant had to say about the cases that were dying, I believe, if we take into consideration cases of all kinds, early and late—wounds of all sorts and operations done by different surgeons—the statistics will show the mortality to be between 80 and 85 per cent. with operation. In civil life we are apt to find, and really do find, a larger calibre bullet making a larger wound or wounds than we see on the battle-field.

Dr. Westmoreland.—Are there any statistics in regard to those who die on the battle-field before they come under treatment?

Dr. Parker.—There are none, to my knowledge.

Dr. Westmoreland.—The statistics given would be of no value as applied to civil life. We know that patients die from wounds of a fatal character immediately, from either shock or hemorrhage, and before they come under the attention of the surgeon.

Dr. Parker.—As I said in the course of my paper, I did not try to give statistics.

Dr. Westmoreland.—I meant as far as civil life is concerned. In regard to perforation, it is not a question of operating, so far as fatal results are concerned, but the manner in which the operation is done. If we take a list of the cases that die after perforation of the intestine we will find that quite a percentage of them die after the operation is made, owing largely to the manner in which the perforation has been treated or the circulation cut off, resulting in either ulceration or gangrene six or seven days after operation. In making a comparative table

I do not think the cases that die should be charged to the operation *per se*, but to faulty technique or the method by which the perforations are closed.

Dr. W. E. B. Davis, of Birmingham, Ala.—I take it that Dr. Parker's paper is not an argument against operation for abdominal wounds. He states this, but says that we have not the facilities for taking care of these cases on the battle-field. I regard this as a great reflection upon this nation. Dr. Hunter McGuire, some years ago, at the meeting in Nashville, when this subject was being discussed, said he looked upon his experience in the army with horror, and expressed sentiments strongly in favor of the modern way of treating these wounds. No one who listened at that time to his discussion could help but appreciate the advantages of the operative treatment of gunshot wounds of the abdomen.

The other papers read to-day have taken strong ground, and I hope that the resolution adopted by this Association two years ago will be reaffirmed at this meeting. It is unfortunate for this department of surgery that some of our leading surgeons hesitate as to what shall be done. Dr. Senn's influence has been harmful. Every community has suffered from his writings on this subject. Senn's gas test has led him into error. In his effort to demonstrate the great value of the test he has made statements which have led to bad practice. Let us analyze this subject a little. It has been well said that if the abdomen is opened under proper conditions by men skilled in abdominal work, where there is no injury to the viscera there should be no deaths. In other words, the mortality ought to be almost *nil*. On the other hand, if there has been an injury we know that if the abdomen is not opened death as a rule is to be expected. No deaths where there are no injuries, if patients are properly operated on. Many deaths if there are injuries to the intestine or other viscera. If an operation is properly done there should not be 50 per cent. mortality if it is resorted to within twelve hours. There has been a considerable mortality on account of the methods adopted in operating. The removal of the intestines from the abdominal cavity and keeping them out for an hour is a serious procedure, and such an operation will produce death without intestinal injury. To remove a portion of the intestine, examine it, replace it, and so on until the whole intestinal tract

has been gone over does not cause great shock and is the method to follow.

At the Charleston meeting of the Association I took the position that to operate after twenty-four hours meant the death of the patient in nearly all instances, and you will remember that Drs. Price and Parker jumped on me with both feet, so to speak, saying that I was making a great mistake. But when you analyze the statistics of various surgeons you will find that nearly all patients die if operated upon after that time. In more than twenty cases operated on by my brother and myself after twenty-four hours they all died. This is not an argument against operative interference, but against late operation.

Dr. George A. Baxter, of Chattanooga, Tenn.—I have been sitting impatiently and feeling that the gentlemen who have been speaking were saying more than they intended when they said that every gunshot wound of the abdomen should be operated on. They always limit it, when it comes to a real understanding of perforating wounds of the abdominal viscera, to early operations. But there is a large class of cases limited further to men skilled in abdominal operations. How many of these cases in the first twenty four hours pass into the hands of those who are skilled in abdominal surgery? I recall two cases that came under my observation, one of which is on record in the proceedings of this Association of the past year, in which the man received a handful of bullets in the back, with bleeding from the mouth and with hiccough. I did not see him for several days. When I did see him I saw it was useless to operate, because the man was getting well. There was one case of penetration of the viscera that got well. This case must be included with those reported. The case was exhibited at a local medical society meeting during the time of the progress of healing a wound, yet oozing was taking place from the stomach, to prove positively that the wounds did exist.

During the last year I saw a man who was shot with a 38-calibre bullet (with intent to kill) midway between the ensiform cartilage and umbilicus. The bullet came out over the upper part of the ileum. I saw the man the third day after he was shot. He was getting well, there being no subjective symptoms.

It seems me to there should be a clear distinction made when and when not to open the abdomen in cases of gunshot injury.

Every physician is responsible for the course he pursues in opening the abdomen. If he is in doubt an operation should be exploratory. These operations should be done early, not late. I do not clearly understand the position of Dr. Senn as to laparotomy for gunshot wounds of the abdomen. I take it that his experience in the late Spanish-American war has been contradictory of the position previously held by him and the position he took during the early part of the summer before going to Santiago. We invited him to address the members of the Chattanooga Medical Society on gunshot wounds of the abdomen, which he did, and clearly outlined his position in regard to their surgical treatment. Unquestionably his experience with reference to operative interference has materially changed since, and whether he urges early operations now I do not know. One gentleman accompanying him—Major Woodbury—the same evening talked about splenectomy on the battle-field, and concluded that it was utterly impossible to do that operation on the field.

There is another exception to early laparotomy in gunshot wounds. We must limit it or take it outside of military surgery. Occasionally it may be done on the battle-field with good results. These cases, however, are better and more successfully treated in hospitals, with proper surroundings, facilities, and conveniences; but we will never succeed in making many laparotomies upon the battle-field with favorable results. I wish, if this Association should pass a resolution, or reaffirm the resolution passed a year or two ago, on Dr. Parker's paper, with which I agree, it would make a clear distinction between an early operation and a late one. This distinction must be made if we expect to stand before the courts of this country.

Dr. John T. Wilson, of Sherman, Texas.—It seems to me that the prognosis in cases of gunshot wounds is dependent upon a number of conditions. Take a patient, for instance, with some of the conditions described by Dr. Parker and Dr. McRae, and they would have considerable influence in the outcome of these wounds. A patient in an exhausted condition, and who is perhaps infected by malarial poisoning, has always more or less shock, and he feels it more than if he were in a good condition. Previous to the Civil War and during that time the abdominal cavity was sacred and few surgeons entered it. Now they can

do it with impunity, and there were some points brought out by Dr. Parker which were very important. In addition to the size of the calibre of the ball it is very important to consider the shape of the ball. Take the Mauser bullets, and you will find they are conical, with a more or less sharp point. It makes a wound clearer and cleaner, and one not so ragged as the larger bullet. Then, too, during the Civil War a great many of the balls were round or larger; they would always leave a large wound, and at the point of exit a ragged one. The smaller bullets do not carry in with them so much clothing as the larger ones, and a great many of the cases of infection came from the clothing that was carried in with these bullets. It is my belief that the majority of these cases suffer more from shock than from septic infection, and it is in these cases where the importance of early operation comes in. If you have a wound of the abdominal cavity, no matter whether it has penetrated the intestine or not, and frequently it does the omentum and even the abdominal wall, you may have concealed hemorrhage somewhere; but you do not always know that you are having serious internal hemorrhage until it is very late and the patient is exhausted. A great many of these cases, too, do not come under the care of the operating surgeon until a number of hours after the accident has occurred.

I believe, as all of the previous speakers have said, that it is extremely important to operate early. There are no signs by which we can be absolutely convinced in every case that there is perforation of the intestine. The character, the technique, and rapidity of the operation are important—a point very forcibly made by Dr. Davis. The intestines should be exposed as little as possible. Exposure of the intestines always produces more or less shock, and the greater the exposure the more profound the shock. A great many of these wounds are inflicted in brothels, in alleys, etc., and the surgeon is compelled to operate early to save life. The conditions are always bad, yet he can always have plenty of hot water, and that is important. I recall two cases in a desperate condition that were operated on. A lady, who was dancing in a ball-room, had a ruptured intra-abdominal pregnancy. She was taken to a room; surgeons were summoned as soon as possible, and when they arrived at the room where the woman was the physician in attendance said there

was no use to operate, that the woman was dying, there being no pulse at the wrist. One of the surgeons said it was his duty to open the woman's abdomen at once. He did so, sought the bleeding vessel, tied it, cleaned out the abdomen, filled the cavity with normal salt solution, closed the abdomen, and the woman is alive to-day.

I remember another case of gunshot wound with an ordinary 45-calibre pistol, which was operated on by a young country physician who had never performed a laparotomy. In this case there were eight penetrating wounds of the intestine. He sutured all of the wounds, cleansed the cavity as thoroughly as possible, closed the abdomen, put the woman to bed, and she is living to-day.

Reverting to Dr. Parker's paper in regard to wounds of the cerebrum, some gentleman asked about the mental condition. We have a good many wounds of the cerebrum that produce little or no mental symptoms except that condition he spoke of as a dazed condition. I have seen quite a number of wounds of the cerebrum where the mental condition of the patient was not affected. I recall one patient who carried a ball in his cerebrum for five years, and he apparently was perfectly well. Many of you doubtless will remember the case that Dr. Hunter McGuire cited at the Richmond meeting of this Association, where, during the last year of the war at the battles around Richmond, a man was shot in the brain, the ball having penetrated the brain substance. He was carried to the hospital, was not operated on, and Dr. McGuire, several years afterward, saw this patient, and his mind was a perfect blank. He did not know anything, otherwise he seemed to be in good health. The Doctor operated on him, removed the ball, closed the wound, left the patient in a good condition, and soon after he recovered from the anæsthetic the patient asked the question, "Where is the army to-day?" The army was on the march when he was wounded, and he asked that question after his recovery.

I cannot agree with one point in the paper of Dr. Parker as to wounds of the spinal cord. If the spinal cord is severed we cannot do anything. In every wound of the spinal cord it is the duty of the surgeon to cut down and remove any spicula of bone, even though it may pass partly through the cord; put the patient in a condition where he can be at perfect rest, so that

the pulse can react, and oftentimes recovery takes place. I have seen several patients recover completely.

Lastly, it is well known that a patient whose system is badly infected with malarial poisoning is much more susceptible than a patient in health, and the suppuration which takes place in such a condition is always greater and seems to be much more severe.

Dr. W. L. Rodman, of Louisville, Ky.—I am sure that we have been very much interested and instructed by the reading of these three most excellent papers and the very general discussion which they have elicited. No more practical subject could be brought before the Association than that of penetrating wounds of the abdomen. The paper of Dr. Parker interested me very much, and I have been disposed to take the same position in penetrating wounds of the abdomen as my friends, Drs. Grant and McRae, believing all of these cases should be operated upon, and the sooner it is done the better. Mark you, I say undoubted penetrating wounds of the abdomen. Dr. Baxter raised an important question when he said that he did not think a laparotomy should be performed for every wound of the abdominal wall. I have pursued this practice in every case of the kind I have seen in the last ten years. The first laparotomy I ever did for a penetrating wound of the abdomen was in January, 1886. I lost the first three—all desperate cases—operated on. I was not deterred by this experience. I have operated on two other cases since, and they have both gotten well. My last case was one in which life had been saved by late operation, the operation being done fifty-one hours after the injury was received. The man was shot with a rifle-ball in the side at about nine o'clock Friday morning; he was brought to Philadelphia on Sunday morning, reaching us about ten or eleven o'clock. He was put on the operating-table at twelve, and operated on, after having travelled by railroad a distance of two hundred miles, and nine miles over the country. I really thought I saved that man's life by operation, but after hearing Dr. Parker's paper am inclined to doubt it. When Dr. Senn and Dr. Parker advise masterly inactivity in the treatment of penetrating wounds of the abdomen under certain circumstances and environments, we know that their conclusions must have been reached after careful thought. Some of these cases get well

after undoubted penetration of the gut, and therefore the statement of Otis that I read years ago and which impressed me so much, that there is not a single incontestable case on record of gunshot wound of the small intestine resulting from the Civil War that recovered, cannot be borne out by recent experiences in Santiago and elsewhere. So I rather question whether I saved that man's life, and whether he might not have recovered without an operation. He had general peritonitis when he was brought to Philadelphia; his temperature was 101.5° F.; pulse 120. I did not want to operate on him, believing that there was no chance for him to get well. As a *dernier ressort*, on account of the teachings of the day in cases of this kind, I was prompted to do an operation. I very reluctantly had him placed upon the operating-table, traced the wound made by the bullet down to the intestine, found a wound of the gut, with a large amount of fecal matter which had extravasated. This was washed out thoroughly and the cavity irrigated. It is possible that the reparative processes of nature had gone on in such a way as to shut off the damaged gut from the general cavity, and he might have been saved without operative interference, and in the course of a few days there would have been discharge of the abscess and of fecal matter, and a fecal fistula follow. The bullet or ball with which this man was shot was a small one, about the same as those spoken of by Dr. Parker. The opening in the gut was quite large, and it took four or five Lembert sutures to close it satisfactorily.

I had hoped that this question of operative interference in gunshot wounds of the abdomen was pretty well settled, but I am not prepared, after hearing the paper of Dr. Parker and reading the papers of Senn and others—men who are scientific and competent—to take such radical ground as I have heretofore done. I am inclined to think that we have all gone too far in our activity in these cases. In other words, the paper of Dr. Parker and the testimony of the other army surgeons that we have had in the last two or three months ought to make us stop and think. Most of us believe that prompt operation under suitable conditions and environments will always give the best results.

I recall the case of a man who was shot about two years ago midway between the ensiform cartilage and umbilicus. He had

been fasting for twenty-four hours. He was shot with a 38-calibre pistol bullet, which I have at home. The bullet traversed the abdomen, fractured the eleventh dorsal vertebra, causing immediate paraplegia. I did a laminectomy in this man's case, but he never had a symptom referable to the abdominal wound. Although the bullet had traversed the entire abdominal cavity, yet the hollow viscera under favorable conditions escaped injury. Dr. Baxter reports a similar case.

Dr. McRae in his paper makes the point that stab and shot wounds are different things. Nearly all stab wounds get well. In the vast majority of instances the intestines will get out of the way of a knife. I recall but one case of stab wound in which the gut was cut, and the man was not seen before forty-eight hours after the infliction of the injury, when he was dying of peritonitis. All the other cases I know of have recovered.

When we consider the experience of Drs. Parker, Senn, and other army surgeons who have talked and written so much during the last few months, it behooves us to be slow in our criticism of men who decline to operate in these cases without the best reasons for so doing; yet at the same time I do not wish to be understood as either advocating or advising a masterly inactivity where the environments are favorable.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—I can hardly agree with some of the remarks that have been made. If a surgeon is confronted with a case of penetrating wound of the abdomen in which there is a perforation of the intestine, particularly if there be extravasation of contents, instead of it being masterly inactivity to let it alone I should consider it criminal inactivity not to operate. If we went to court to testify in such cases I think we would be apt to take the stand that it is criminal inactivity not to operate. I am not surprised at the position taken by Dr. Senn in regard to this subject, particularly if he uses the hydrogen-gas test as a diagnostic measure. I think his gas, if it did no other harm, would in the majority of cases infect the patient, even though the operation may be successfully performed, and result in death from peritonitis. If the statement made by Senn in his Presidential Address at the meeting of the American Medical Association be true, namely, that "scarcely a day passes without finding pus," we can account for the position he takes in regard to this class of cases.

In regard to bullets traversing the abdominal cavity without injuring the intestine, Dr. Hunter McGuire, a number of years ago reported nine cases in which he made post-mortem examinations, and all of them died of peritonitis, showing that a bullet can traverse the abdominal cavity without perforating the intestines. It also shows that in quite a large number of cases the danger practically is as great as if the hollow viscera have been injured.

There is a considerable difference between the average bullet you see in civil practice and those that are used on the battlefield. The average bullet observed in civil practice is always larger than those used by either one of the guns in the recent war, with the exception of the Springfield. Lead bullets jag the clothing, and are more apt to produce jagged wounds than the Mauser bullets. This plays an important part either in fecal leakage or in the result of the case. But individual experiences should have no bearing upon such an important subject as this. We are here to enunciate principles that must be followed.

I have had four cases in which, so far as I could tell without exploratory operation, which I rarely undertake, that the bullet must have penetrated the abdominal cavity. All three patients declined operation, and all got well. What does that show? The bullet may not have penetrated the abdominal cavity, and I did not explore the cavity to see whether it did or not. It may have penetrated the solid viscera, as the liver or kidney, where adhesions were set up promptly, without there being an apparent injury. In one case the liver and kidney were perforated, the patient recovered, and this deterred me from operating on other cases.

Another point of much more importance is not whether we should operate, but the manner in which we should treat the intestines after we have opened the abdominal wall. I am of the opinion that many cases die after operative interference. They do not die from the operation or shock *per se*, but from the faulty technique employed in the operative procedure. A man not accustomed to doing abdominal surgery, if he has a gunshot wound of the intestine close to the mesentery, probably cutting off the circulation of the intestine, the chances are that in nine cases out of ten he will close that wound without thinking of restoring the circulation, and consequently death may take place from

either ulceration or gangrene. On the other hand, the experienced surgeon would make a resection in such cases.

Dr. Parker (closing the discussion on his part).—Some of the members did not catch the points I tried to make. I endeavored to make a distinction between the treatment of abdominal cases on the battle-field and in civil life. While, as I said, I am very strongly opposed to laparotomy on the field and under the conditions that existed, I am not opposed to it in gunshot wounds of the abdomen in civil life. Indeed, in civil life I believe as much as I ever did that the thing to do is to get in and get out of the belly as soon as we can do so consistent with good work. I agree with Dr. Wilson that we should use plenty of hot water.

As to the question of shock in these cases before operation, I believe when we see what looks like shock it is hemorrhage, and the more I have seen of these cases the more do I believe it is true.

I am more firmly impressed than I have ever been before with the conservative plan of treatment in wounds of the kidney. Unless there are wounds of the renal vessels, of the ureter, or of the pelvis of the kidney, with great hemorrhage, I do not think we should remove the kidney. I know that some surgeons who are prominent in this line of work advocate it, but I consider it a mistake. Taking Dr. Keen's own cases in which he advises removal of the kidney, the table shows a much larger percentage of recoveries where the kidney was not removed than where it was.

In looking up the question of prognosis, not only with reference to early operation, but as having a bearing on the mortality and the number of hours before operation, I was surprised to hear as good results from resection as Dr. Grant found. I mentioned thirteen cases of resection of the bowel after gunshot wounds, with but one recovery. That is my recollection of the table. Two out of three is a remarkable record in that line.

As to the technique, there are one or two points in which I differ with some of the previous speakers. One gentleman spoke of small incisions. I believe in making a small incision, but it should be large enough to be able to see well and to do thoroughly what one is going to do. I do not believe in making an unnecessarily long incision, but it should be sufficiently long to give the surgeon a chance to examine the cavity thoroughly.

I do not believe in limiting myself to a two or three-inch incision.

I think the question of the line of suturing of the bowel in these injuries is important; I believe it should be in the long axis of the bowel.

As to the case reported by Dr. Rodman, I question very much whether he saved the man's life by operating.

As to the sixteen wounds without perforation, Dr. Senn conducted some very interesting experiments along this line on the cadaver. He found in wounds above the umbilicus, if my recollection serves me right, that in about 16 per cent. of the cases there was no perforation of the hollow viscera, but in wounds below the umbilicus he believes it is necessary to operate; but cases did get well where the intestines were perforated. I have seen several cases in which I was satisfied perforation of the intestine had occurred. One of them was a man that I saw the first year I studied medicine, he being a patient of Dr. T. G. Richardson. At that time surgeons were not opening the abdomen so much for gunshot wounds. This man got well without laparotomy. The wound was a little to the left of the umbilicus. At the end of about five years the man came back to the hospital with another gunshot wound of the abdomen, an inch and a half below the umbilicus, and the late Dr. A. B. Miles found fourteen perforations of the intestine, all matted together, but he got well. He was a good subject for gunshot wounds. I recall the case of a man who was shot in the left lumbar region with a double load of buckshot; twelve of the shot came out in the right iliac region. He was doing so well three or four days after he was shot, the time when he came under my observation, that I decided to temporize. I found it necessary subsequently to open the wound and let out pus. There was sloughing of the gut, and he had a fecal fistula which finally closed.

Cases do get well after perforation of the intestines, especially perforations made by small bullets, if the intestine happens to be more or less empty.

Dr. Julian T. Field, of Fort Worth, Texas (by invitation). —I have enjoyed the discussion very much. We know that the peritoneum takes care of a certain amount of sepsis, and that we can get rid of it with normal salt solution, flushings, etc.; but frequently we cannot get rid of enough, or rather the individual

cannot take care of enough, and what we need is some agent to destroy the pathogenic germs in the peritoneum. I have noticed recently—I cannot remember where I saw it—in the literature that formalin has been used for this purpose—1 : 2000. The gentleman had operated on a number of animals, and had used it with success, in that peritonitis was relieved. It seems to me it is along this line that we must expect to get favorable results. I have no doubt some of the members have read the article I refer to. The formalin destroys the pathogenic germs and prevents peritonitis.

Dr. McRae (closing the discussion on his part).—I wish to mention simply one or two points that have been brought out in the discussion. Dr. Baxter mentioned the time of operating. I took occasion to state in my paper that I thought the proposition should be laid down, in penetrating wounds of the abdomen, to operate as early as possible. I believe a large proportion of late operations will terminate fatally. A large number of the operations on cases done after six hours will end fatally. Dr. Senn and others have pointed out that the most favorable location of these wounds for the viscera to escape in the upright position, is above the umbilicus. The hollow viscera frequently escape where the individual is standing upright and the point of entrance of the bullet is above the umbilicus; where it is below that point the hollow viscera are almost always injured.

Dr. Parker slightly misconstrued the remarks I made upon the case of injury of the kidney. I believe, as he does, that where the large vessels are wounded, the pelvis of the kidney has been opened, or, where the ureter has been opened, that the kidney should be removed; in those cases nephrectomy is absolutely essential to save the life of the individual.

Dr. Grant (closing the discussion).—I have only a few words to say. I think the Association is indebted to Dr. Westmoreland for calling our attention to the fact that we are discussing surgical principles, not individual experiences; but what we wish, as surgeons, is to do the greatest good in the greatest number of cases, and we are here to discuss and adopt those principles which shall serve as guides to our operative steps. Individuals escape in many instances from accidents or conditions that are almost invariably fatal. Because a man falls out of a balloon from a considerable height and escapes, or falls three or four

stories from a building without suffering injury, is that any reason why we should encourage others to undertake similar experiences? What we wish to understand clearly is what is the best thing under certain circumstances. The first and most important part is to consider the conditions presented to us. I have been misunderstood, or else my paper did not clearly state my position. I distinctly stated that in the treatment of penetrating wounds of the abdomen the first thing to be done is to transport the patient to a convenient place, when a skilled hand should do a laparotomy. All cases practically operated on after twenty-four hours perish.

As I stated in my paper, I believe it is impossible to make a diagnosis of perforation of the intestine with any degree of certainty. Therefore, I look at the subject in this way: If a patient is seen within eight or ten hours after an injury of this kind, under favorable surroundings, it is an established surgical principle that a skilful surgeon should determine whether the intestine has been penetrated or not. If it has this surgeon will not be afraid that an exploratory operation will result fatally; he will immediately make it, knowing that he cannot hurt his patient, and that he will probably save his life. There is not a member of this Association present who, if he knew he had a perforation of his intestine, would not submit to an operation, whether it was going to hurt him or not. All persons, under favorable surroundings, who have penetrating wounds of the abdomen, have a right to the chance of laparotomy within a period when such operations are usually successful, namely, any time up to the first twenty-four hours. If it is purely a question of the condition the individual presents, if he is getting well, let him alone. If he has general peritonitis, flickering pulse, cold hands and feet, you had better not operate unless he or his family demand it.

Dr. Rodman is unusually modest. He undoubtedly saved his patient's life; he saved him from having a fecal fistula. He did the proper kind of operation that eventually would have been necessary.

A PLEA FOR THE MORE CORRECT APPLICATION OF THE EMMET METHODS IN PLASTIC SURGERY.

By W. D. Haggard, Jr., M.D.,
Nashville, Tenn.

The brilliant achievements in abdominal surgery have so far outshone the humbler plastic operations that their perfection has been very much impaired. The apothegm that "whenever anything is as good as it can be it cannot get better" is particularly applicable to the work of the early school of gynecologists. It is equally axiomatic that when progress approximates perfection it ceases to improve, and decadence ensues.

Plastic surgery of the vaginal walls and cervix uteri of the present is a polyglot of many methods, widely differing in principle and hopelessly diverging in practice. It is usually the *bête noir* of the practitioner, the unfruitful field of the general surgeon, and the *négligé* work of the gynecologist. It is not that we love it less, be it said, but that we love major work better. In addition to these obvious reasons for the deplorable lack of excellence in much of this class of work, and to the general apathy in this department of surgery, there are more material and serious impediments to perfected results: A somewhat exaggerated idea of the importance of the perineal body, so-called; the lingering belief in its similitude to the keystone of the arch in its office of supporting the uterus; the failure to appreciate the rôle of the pelvic fascia in maintaining the integrity of the pelvic floor and its functional relations; and more especially the

failure to grasp the results of its injury and the mechanics of production of rectocele, together with the exact methods for its correction. Finally, the employment of other suture material than silver wire. Even when these elementary facts and their significance are known theoretically the mechanical difficulties in meeting the anatomical and physiological indications are very considerable. More, perhaps, than in other surgery. It has been said that much of modern surgery tends to dissociate it from the characterizing manual dexterity from which it derived its name, yet the substitution of instrumental for manual manœuvres is essentially necessary in the class of operations referred to. Its successful execution requires a special aptitude, nicety of judgment, delicacy of manipulation, and the inherent modelling and coaptation of parts which is signified by the word plastic. In this branch is found one of the highest exemplifications of science wedded to art, because the creative feature, the object to be obtained, and the highly artistic means of attaining it, pre-eminently stamp it as essentially an art.

Plastic surgery received its first impetus from the pioneer work of that great master—Sims—when, in 1845, he made the brilliant cures of vesico-vaginal fistula on the patients whose fortitude and high courage entitle them to share something of the gratitude of posterity for participating in those wonderful discoveries that made lacerated woman whole.

It is a unique circumstance in the annals of surgery that the instruments which made that feat possible and the fundamental principles of success have remained unchanged.

It is not so much the tribute of homage to unprecedented genius as the truth of the great principles he enunciated, and the perfection of his devices. It may be said, then, that the surgery of vesico-vaginal fistula has remained unchanged since the operation for its relief was given to a waiting world by its incomparable originator. It is a subject of regret that more of our art has not become crystallized into such classic perfection.

Trained in this embryo school under the great Sims himself, possessed of a remarkable sense of adaptation, great patience, untiring energy, and a delicacy of touch rarely seen in man, was Thomas Addis Emmet. He utilized his unparalleled opportunities in extending the application of the methods of Sims in fistula to injuries of the adjacent soft parts.

In 1874 he read the historic paper on "Laceration of the Cervix as a Cause of Disease," which swept away the mythical "ulcer of the womb" from the nosology of disease, subtracted much from the sum of woman's sorrow, and forged the second link in the immutable trio of perfected plastic operations.

It would seem that an operation so accurately described, so universally practised, and by so many men, would be more correctly performed; yet I have seen many operators simply cut out a variable plug in the angles of laceration and sew it up by through-and-through sutures, very much as one would the corners of the mouth. No attempt was made to remove all the cicatrical and cystogenic tissue or to maintain the conical form of the cervix. In addition to attention to these cardinal points it is extremely essential to preserve the continuity of the cervical canal down to the new external ostium, and in the suturing to avoid the formation of pockets, which are caused by leaving irregular recesses unapproximated by the sutures. The denudation is the scientific aspect; the suturing the artistic consideration. The hard cicatricial plugs in the angles and the oft-associated honeycombed condition of the cystic tissue, require careful excision with the sharp-pointed curved scissors, and very often amputation of the cervix. The *raison d'être* of the operation is to remove all abnormal tissue. It may be compared in one sense to a sequestrum of bone, and the further analogy of the necessity of complete removal be carried out, as we do in necrotomy. The hard tissue can sometimes be peeled out like a corn, in one piece. The finger can best tell when all diseased tissue is removed. A proper appreciation of this fact causes one to regard instruments made to bite out an arbitrary piece of tissue as a biscuit

cutter does, as extremely crude and in discord with the harmonizing indications and operative corollary.

The sutures, when introduced to close the excavations, are arranged like the ribs of a palm-leaf fan, the undenuded strip which is to constitute the new canal forming the rallying point, and each suture making a lesser angle with it, until the last one on each side is almost parallel with the margin of the cervical canal.

The difficulty of passing the needle underneath the deepest portion of the excavation and drawing out the point of the needle when it presents is overcome by pulling up the bottom of the cervical stump so that the needle may be shoved along on a plane and the point elevated. Counter-pressure made with a tenaculum will facilitate the passage of this needle without breaking and tedious delay.

When the site of the proposed canal on the everted anterior and posterior lips is felt to be free of hard tissue then the original operation of Emmet—bilateral trachelorrhaphy, herein described—will suffice, no matter how deep the laceration. However, the majority of cases seen at the present time requiring operation are the ones with large, hypertrophied cervices, with indurated tissue containing numerous cystic follicles. The rule "to remove all morbid tissue," when applied in these cases, necessitates an amputation of the cervix. It finds its analogy in the indication for removal of hypertrophied indurated tonsils, the relic of recurring inflammation. We also know that if we do not remove all dense cicatricial tissue in the cervix that it will be only a resection of the disease, and "the vaginal flaps will be brought over the morbid tissue as a prepuce." Amputation can be substituted for trachelorrhaphy at any moment of the operation. The excision should be conoidal; the sutures so arranged as to pass through the anterior lip and out through the canal. A sister suture through the posterior lip unites mucosa of cervical canal to vaginal mucosa. Apposition sutures through the stumps draw the vaginal flaps snugly over the cervical stump like the cover on a ball.

Emmet's operation on the posterior vaginal wall was of more gradual evolution, but the later operation devised in 1876 does not differ materially from the old trefoil denudation. It must be asserted that Emmet was the first operator to include the rectocele, or, indeed, any portion of the posterior wall of the vagina in the operation for laceration of the perineum so-called. Then the multifarious operations devised for repairing the pelvic floor or vaginal outlet, which includes the posterior wall of the vagina, are but modifications of his operation: The misconception of the operation for laceration of the perineum, so-called, is due to, (1) misconception relative to the exact nature and pathology of the injury; (2) the almost insurmountable difficulty in depicting the operation by diagrams, and the impotence of word description in giving precise directions for its exact performance. The first of these hinderances I consider the gravest, and attributable to popular idea of the perineal body which Emmet describes as a body that does not exist. The essential lesion in injuries to the pelvic floor is a tear of the pelvic fascia which runs along the lateral sulci of the vagina to which it is attached. The tear occurs where it is reflected upon the front of the perineal muscles, of which it forms the sheath, and which it binds together. This condition exists in the tears, indicated by the transverse scar, rectocele and relaxed vaginal outlet, commonly seen in the injury incorrectly designated as laceration of the perineum, but most accurately termed laceration of the posterior vaginal wall. The destruction of the integrity of the pelvic fascia is the sole pathology. The sense of bearing down characteristic of this condition is caused by the congestion of the bloodvessels consequent upon the lack of support, through the above-mentioned injury to the pelvic fascia, which, in its support of the bloodvessels, has been likened to "the trellis supporting the grape-vine." The seeming destruction of the perineal body is really only the retraction of the lavator ani muscles which from the loss of support from its sheath, the fascia is pulled apart by the transverse perineal muscles, like "two leaflets of a window curtain separated at the bottom,

while they remain attached above." The twofold function of this muscle, to close the vulval cleft during defecation and to assist the dilatation of the sphincter ani being lost, each stool thus finds an imperfectly dilated sphincter, an unclosed vaginal orifice, a weakened recto-vaginal septum, a convex rectal curve, all of which predispose to rectocele. The constant eversion of this rectocele by defecation, under the circumstances above enumerated, pulls down on the cervical attachment of the posterior vaginal wall, predisposing to retro-displacement, which is the first step toward descensus. That the destruction of the pelvic fascia is the essential cause of rectocele, which in turn produces consecutive prolapsus, is proven by the fact that women who have true laceration of the perineum—*i. e.*, complete tear through the sphincter and the recto-vaginal septum, do not have prolapsus. The uterus is not supported by the perineum, as formerly taught, but "is swung from above like all other organs in the body." These women do not have the bearing-down found in the class with transverse tears and the laceration of the pelvic fascia. They do not suffer any discomfort whatever except from incontinence. The reason of all this is because, in the central, complete tears referred to, the fascia is not or cannot be involved. This is the inevitable logical conclusion.

The mechanics and pathology of the results of injuries to the floor of the pelvis may be summarized by the comprehensive reply of a student whom I asked: "Why does not a woman with complete laceration of the perineum have prolapsus?" He replied ingenuously: "Because she has no rectocele." "Why has she no rectocele?" "Because the pelvic fascia is not torn."

The converse of these propositions is, of course, true, and these brief statements comprise much of the unwritten mechanics of many displacements as well as the essential pathology of laceration of the pelvic floor.

The rational correction of this complex condition, then, would not be, not to sew the labia together, which is the popular procedure in one class of operations, nor to denude

an arbitrary area of fanciful shape on the rectocele and bring the edges of the raw patch together, after the fashion of another class. It would rather be, in the language of Emmet, "to catch up the retracted pelvic fascia at such a point and in such a manner as to 'take in the slack,' as it were, of the fascia throughout the pelvis. By this procedure the displaced posterior vaginal wall is certainly lifted up and drawn forward in contact with the vesico-vaginal septum. As the steps of the operation advance the displaced anus is lifted upward and forward, the everted tissues at the vaginal outlet gradually rolled in, and the separated levator ani muscles brought together."

I shall not attempt a detailed description of the technique, because I realize the futility of conveying a composite idea of the method, which, to be properly understood, must be seen, preferably at the hands of the venerable Emmet himself. I am not unmindful that this good fortune has been enjoyed by many present. I will simply accentuate a few of the essential features.

Based upon the conception of the injury outlined in the foregoing, the first and important step is to determine that point on the rectocele which, when drawn down by a tenaculum, will present a triangular, trowel-shaped area, marked laterally by two folds which lead up to fixed points in the lateral sulci which mark the limit of retraction of the fascia.

If this is not determined with precision it is obvious that any attempt at reuniting the sundered and retracted fascia, thereby restoring the equilibrium of the circulation in the pelvis and drawing together the separated levator muscles, will fail and the whole object of the operation be defeated.

This tongue-shaped portion of the posterior wall of the vagina, when drawn down, will constitute the new posterior vaginal wall, because the denudation will include that part of the rectocele marked laterally by the lowest caruncle and below by the junction of the mucous membrane and skin, extending above into each lateral sulci to the triangular, fixed points before referred to as indicating the extent of retraction

of the fascia. The denuded area, diagrammatically speaking, would correspond to the space between the straight lateral and oblique middle legs of the letter M, the ends of the lateral legs being connected by an exaggerated semicircle. The space above and between the two oblique middle bars of the letter M would correspond to the undenuded tongue-shaped portion of the rectocele; the angle formed by the junction of the outer and middle legs would correspond with the fixed point, and the outer bars to the limit of retraction of the pelvic fascia as previously determined. The semicircle connecting the lower ends of the letter would designate the junction of skin and mucous membrane.

The sutures that unite the two lateral triangles, and thus catch up the retracted fascia, are introduced in the shape of an inverted triangle, the basic points corresponding to the points of insertion and final exit at the edges of the denudation, and the apical point being in the centre of the denuded triangle at the point of first exit and re-entrance of the suture, where it changes direction. The sutures underneath the semicircular denudation pass transversely across the area, the first or "crown stitch" traversing the tip of the undenuded triangle. When the two sets of lateral sulci sutures are shouldered and twisted they do not only approximate the edges of the lateral triangles, but at the same time draw up and in the underlying tissues previously everted and displaced. The transverse sutures which draw together the lavatores when tightened draw the circular edges of the denudation into a linear line of approximation. It will be noticed that this entire operation is on the posterior vaginal wall, and hence Emmet's name for it. It has not involved the skin or labia, and the sutures are all *inside*. So perfect and secure is this approximation that I have frequently seen Emmet turn the patient on her side, and, for the purpose of demonstration, introduce a Sims speculum and retract the perineum without the slightest disturbance to the newly constructed vaginal wall and in nowise marring the perfection of the result.

The operation for complete laceration through the sphincter

is more amenable to pictorial description, and, I think, is more generally understood. It is the simplest and most beautiful of all the operations for this injury. In its simplicity consists its beauty, and, as it is solely instituted for the restoration of the sundered ends and broken circumference of that muscle, no mutilating and arbitrary flap-splitting is done; but the ends, infallibly lying under the two dimples, are lifted up, laid bare with scissors, and united by a suture going behind the sphincter end and drawing the straightened and retracted sphincter into a circle again.

The margins of the recto-vaginal septum are freshened and approximated. It has always been the custom of Dr. Emmet to introduce the cleft sutures before the ones to bring the sphincters together. To show the remarkable versatility of this master plastic mechanic, on a certain occasion, when some of the most distinguished men of two continents were at his clinic, he deliberately reversed the plan of a lifetime and introduced the sphincter suture first. He advised those of us who were assisting him to adopt that practice. I do not know that he has ever publicly recommended that modification, but I take the liberty of repeating his suggestion.

Of the operation on the anterior wall I will not speak at this time, nor of his inimitable work in making an artificial urethra. This is an acme of adroitness that we cannot hope to duplicate, and fortunately the occasion for its employment is exceedingly infrequent.

I cannot refrain from decrying the too general practice of substituting other suture material for silver wire in the cervix and vaginal walls. This innovation in plastic work is due to the invasion of gynecological territory by general surgeons, who are just emerging from the use of silk as a universal suture material and adopting silkworm-gut for use in all localities where it can be removed. The general practitioner also essays plastic work, bringing to bear the results of his restricted experience in sewing up skin and scalp wounds.

The newer school of gynecologists, who are unacquainted with some of the older and good methods, are applying cat-

gut sutures to the cervix to avoid the trouble of removing them, and also trusting them, in the most awkwardly situated region of the body, to protect from infection—the perineum. The non-use of silver wire is perhaps as much responsible for failure in plastic work as nearly any other factor. It is the only suture that can be precisely controlled in the degree of tightness, and, indeed, it can, if accurately bent or "shouldered" where it crosses the line of proposed approximation, be made to constrict the parts in the most delicately adjusted apposition, neither too tight nor too loose. The physiological peculiarities of the erectile tissue of the genitalia—that of rapid engorgement and depletion—require an unyielding suture material, and one that will permit of the resulting involution as repair proceeds. Moreover, silver wire is easily and surely rendered aseptic, and, indeed, is supposed to have the property of forming an antiseptic salt with the fluids in the tissues in which it is embedded. It can remain indefinitely, and the longer it remains within surgical limits the better the results. Three weeks is the orthodox time for the cervix. The application of silver sutures requires some practice and much patience, and takes a little more time, but the last element is not of much moment in minor work with good kidneys and expert anæsthesia, which is the only sort that should ever be permitted, as I recently had sad occasion to realize.

In every branch of art there is a troop of imitators who follow so closely the hall-marks of the original that the spurious can scarcely be distinguished from the genuine. So closely are mannerisms copied in literature, art, sculpture, and the drama that the imitators create a distinctive school. This accuracy of duplication is rendered possible by the faithful and scrutinizing study of the original pattern.

The unlimited opportunities for the study of models in the arts are obviously impracticable in plastic surgery. We cannot all have the privilege of seeing the peerless Emmet, although a distinguished Fellow of this Association says that everyone who aspires to do this work ought to. I would not

presume to say that one must see him or his followers to do good work. I regret that many of his pupils do not or cannot copy his methods, and I do not hesitate to say that those of us who do conscientiously strive to imitate him fall very short in our poor efforts; but we have, at least, the satisfaction of having a correct conception of the highest ideals in surgery.

THE DISSECTION AND LIBERATION OF THE SPHINCTER-ANI MUSCLE, FOLLOWED BY ITS DIRECT SUTURE IN CASES OF COMPLETE TEAR OF THE PERINEUM, WITH A SPLINTING SUTURE PASSING BETWEEN THE OUTER AND INNER MARGINS OF THE MUSCLE.

By H. A. Kelly, M.D.,
Baltimore, Md.

Although great progress has been made in gynecological plastic surgery within the past twenty years, there have been few or no changes in the treatment of complete perineal tears —that is, those which extend through the external sphincter ani.

The common symptom of a complete tear of the perineum is the lack of control over the functions of the bowel, characterized by the involuntary escape of feces and gases. These sequelæ, however, are not invariably present in the same degree in all cases, and there is a diversity among them, varying all the way from the entire loss of function on the one hand, to perfect control on the other.

Some surgeons, reasoning upon purely *à priori* grounds, have gone so far as to assert that it is impossible for a woman with a divided sphincter to exercise any control whatever over the bowel function; I know, however, from repeated clinical evidences, that perfect function may sometimes persist; it becomes, therefore, necessary to discover some satisfactory explanation of the facts rather than to deny them.

I would divide the cases of complete tear to be investigated from this stand-point into two groups: First, those in which the tear barely extends through the sphincter and goes no further; and, second, those in which the sphincter ends are separated by a well-defined interval of a centimetre or more.

In the first of these groups, where the muscle is only just divided and the ends lie close together, the cicatrization which follows the injury is a conservative effort on the part of nature, and soon results in the approximation of the ends of the muscle, knitting them firmly together, with only a plug of scar-tissue between. In this event the muscle is no longer in a true sense a sphincter, as it cannot contract equally from all directions toward a central point, but is compelled henceforth, by the break on one side and the interposition of a plug of unyielding connective tissue, to contract up to the scar as a more or less fixed point, which it does with greater or less efficiency. This peculiar effect produced upon the sphincter by the interpolation of a mass of scar-tissue was pointed out many years ago by Hilderbrandt.

The second group relates to those cases in which the sphincter ends are not bound together. I have at present under my care a patient with a complete rupture of the perineum, with deep, perfectly marked sphincter pits, separated by the entire breadth of the anal orifice, with a relaxed, everted vaginal outlet and a uterus in descensus and retroflexion, and yet the patient has absolute control over fecal movements, whether formed or liquid, and is never disturbed by involuntary escape of gases. What is the explanation of this fact?

A careful physical examination shows that the patient has perfect voluntary control over the internal sphincter muscle, extending from the external sphincter about 2 cm. upward.

The tonic contraction of the internal sphincter and its response to a voluntary effort can be readily tested *in propria persona*. If, while sitting in a warm bath, the tip of the finger is well oiled and inserted about an inch into the bowel,

at the same time slightly bearing down to relax the sphincter, then, upon causing a voluntary contraction, a prompt response on the part of the internal sphincter will be noticed. When not voluntarily relaxed the internal sphincter is in a state of tonic contraction, guarding the orifice, while the external sphincter is not contracted.

I believe, therefore, from repeated clinical observations that the tonic control exercised over the bowel functions resides in the internal sphincter ani and not in the external, and that the external sphincter muscle is a provision against an emergency, and is intended to form a temporary powerful supplement to the internal sphincter.

The external sphincter is of further use in the act of defecation, in breaking the fecal column at intervals, and clearly tending to prevent prolapsus recti by creating a pause in the act and allowing time for more material to pass down into the rectum before the renewal of the straining.

This physiological fact explains the reason why, when the external sphincter ends lie close together and the internal sphincter is therefore uninjured, continence is preserved; I would add, too, to this category of manifest sphincter injuries a much larger group of cases in which, owing to the fact that control over the bowels is retained, as well as owing to the natural uninjured appearance of the anus, suspicion is disarmed, and the surgeon, even when he is brought into such close contact as is involved in the performance of perineal operations, fails to recognize the fact that the sphincter ends are divided. I cannot sufficiently emphasize the importance of this observation, and therefore reiterate my belief that many women have torn sphincters which are never discovered.

On the other hand, when the ends of the external sphincter are separated by an interval in a recent tear, then the internal sphincter is also torn, and the wider the separation of the sphincter ends the greater the tear into the bowel and, therefore, the internal sphincter above. What is true of the recent injury is true *à fortiori* several months later, when a wide

tear is drawn down to a narrow line, and an interval of 1 cm. between the pits may represent a rupture 3 cm. in depth. It is, therefore, to this tear of the internal sphincter that the loss of control over the bowel functions is due.

Operation. The prevailing operation in this country is the Emmet, which I need not describe in detail, as it is so well known. The operations practised in Europe, for the most part are of a similar nature, or flap-splitting, or Hegar's method. The important principle in the Emmet procedure consists in the application of a series of sutures to an area thoroughly denuded, first closing the bowel, then radiating out from the bowel over the skin and on to the vaginal surfaces. Emmet further lays great stress upon a tension suture entering and emerging at points outside of and well behind the sphincter ends and traversing the septum, for the purpose of supporting and keeping the sphincter ends together, while the remaining sutures provide for accurate union throughout. Dr. Emmet told me on one occasion that the devising of this suture cost him more thought than almost anything he had done in gynecology.

Although this operation, as well as the others mentioned, when well carried out succeeds admirably in many instances, it still leaves much to be desired in that there does remain a residuum of failures and a considerably larger percentage of cases in which the function is so imperfect at first that we are obliged to wait weeks or months for the patient to gain a satisfactory control; and sometimes in this latter group there are women who will tell you that when their bowels become loose they always find their clothes more or less soiled, while they are also apt to be uncertain about the control of gases.

In order to meet the various objections to the operation practised at present I have devised several procedures based upon the physiological principles dwelt upon above. The first important point is the dissection and liberation of both ends of the sphincter muscle, after which they are sutured together with buried catgut sutures, end against end.

I can, perhaps, best emphasize the importance I wish to give

Fig. 1.

Showing the natural appearance of orifice after six attempts to restore the sphincter and secure control over the bowel function. The dotted line shows where the incision was made to expose the sphincter ends. A and B are pulled apart as shown in the next figure.

Fig. 2.

Shows the sphincter ends as they were found on pulling flap A up and flap B down. The right end lay near the median line and the left displaced attached close to the tuberosity of the ischium. One of the catgut sutures in place ready to bring sphincter ends together.

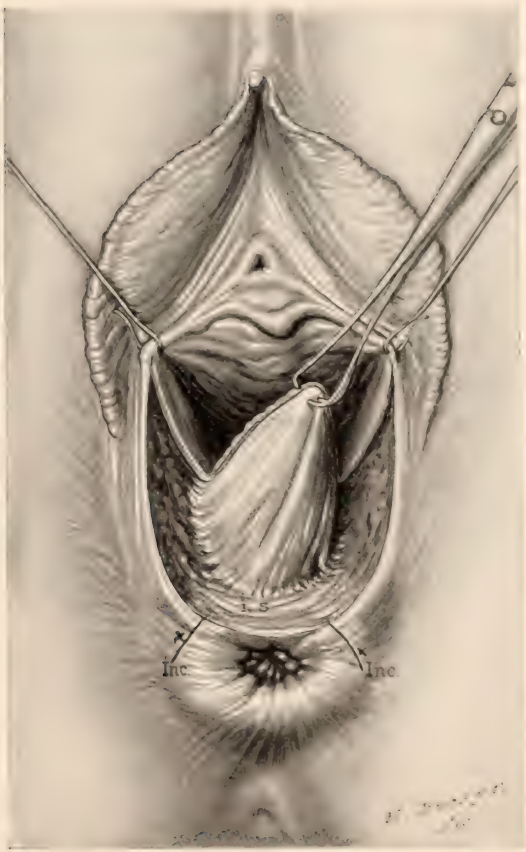
Fig. 3.

Appearance after the union of the sphincter ends and the closure of the skin wound, with interrupted silk sutures.

Fig. 4.

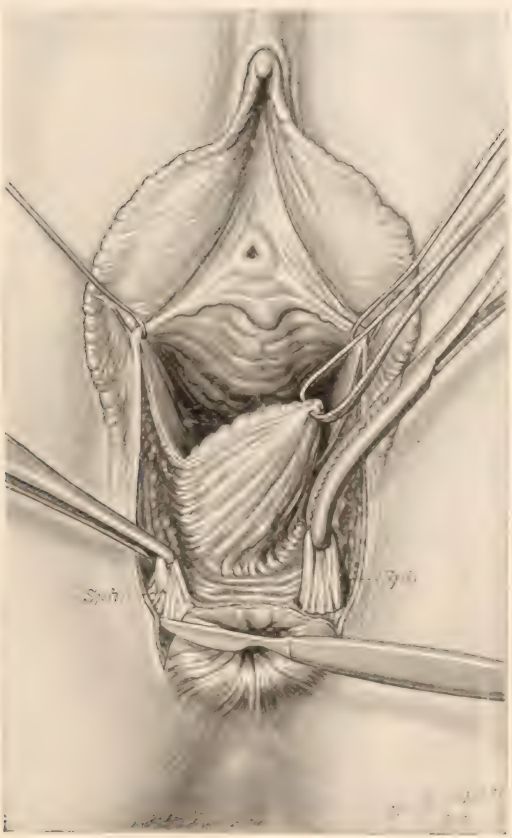
Showing skin flap held down and sphincter ends united by three interrupted catgut sutures. This was a case of deep injury of the sphincter without tear of the skin over the anus and without a tear into the lumen of the bowel.

Fig. 5.



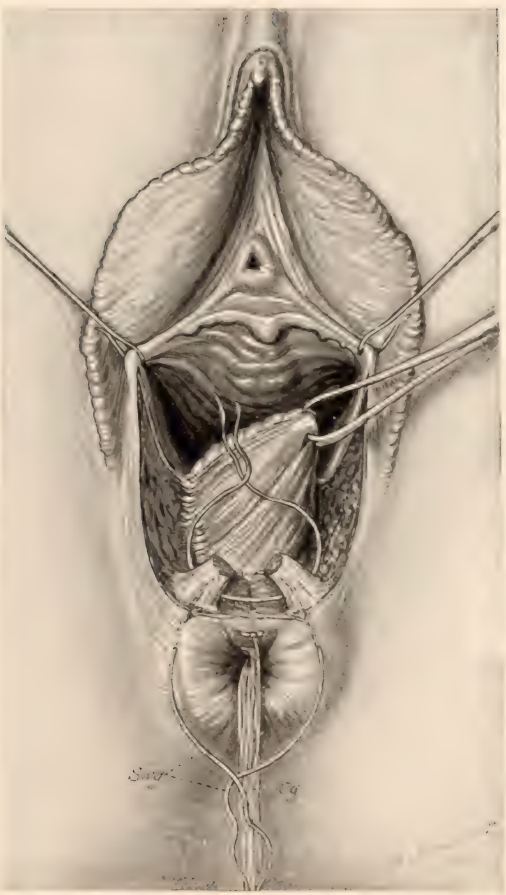
The denudation on vaginal and perineal surfaces. The tongue of tissue in the middle lifted up and dissected loose from the internal sphincter (i. s.). The denudation does not, however, expose the external sphincter, which is in this case laid bare by the two incisions (Inc) parallel to the anal orifice.

Fig. 6



The incisions made as shown in Fig. 5 and the sphincter ends bared by dissection.

Fig. 7.



The denudation completed and rectal sutures tied, uniting the internal sphincter and radiating out into the skin surface.

Fig. 8.

The rectal sutures all in place and the sphincter (Sp) ends united by three buried catgut sutures. A silkworm-gut tension suture passes through the centre of the sphincter muscle up around through the septum.

this step by citing the first case in which I was led to operate in such a way.

Case I.—The patient was brought to me in December, 1897, by Dr. Sexton, of Raleigh, N. C. She had had six previous operations for complete tear of the rectovaginal septum, and upon inspecting the parts I found perfect union throughout, a pathologically small, well-closed anus, and a far better result in the external appearance than is often secured in cases which are deemed successful. In spite of appearances, however, she had no control over the function of the bowel, and the gases escaped audibly at all times, and formed movements were discharged at once without the slightest ability on her part to restrain them. (Fig. 1.)

I was disinclined, from my examination, to do anything further to this patient after all she had passed through, doubting whether I could improve her condition, but, through Dr. Sexton's kind insistence, I felt at last forced to make at least an earnest effort to better her state; so I operated December 8, 1897, determined to make a clean dissection of the external sphincter, even, if necessary, going so far as to lay the entire muscle bare, so as to make sure of bringing its ends into apposition, and leaving the end of the bowel encircled by a good muscular ring, if one could be found in the neighborhood.

I began the operation by making a semilunar incision, with its convexity directed toward the symphysis, half-way round the anal orifice and about 1 cm. from the anal margin. (Fig. 2.) As the dissection through the scar-tissues was carried into the perineum the edges of the incision were drawn up and down, exposing a wide, crescentic area. I found now that the sphincter could be beautifully demonstrated anatomically, and that the right end lay nearly in the normal position, fixed in the median scar, while the left end lay at least 2½ cm. distant (Fig. 3) from the right end, and was attached to the tuberosity of the ischium. After laying bare and freeing about 2 cm. of the ends, I then trimmed off the scar-tissue so as to expose fresh red muscular bundles, which I united with three interrupted catgut sutures, simply transfixing

the muscle 5 or 6 mm. from the cut ends. Two buried sutures were also used in the septum, in the deeper fat layers of the wound, and the skin was finally closed with fine silk sutures. The result was a perfect union and greatly improved control of the bowel from the first. I examined the patient again two months later, and, passing a finger a short distance into the rectum and grasping the sphincter between finger-tip and thumb, could distinctly isolate it on all sides, and, on telling her to contract the muscle, I could feel that it was perfect throughout and under complete control. I do not know of any other instance in which, with an apparently well-formed anal orifice, the sphincter muscle has been laid bare and the separated ends freed from their attachment and then joined by buried sutures.

Following the initiative of this case, I at once incorporated the isolation and separate suture of the sphincter muscle as an essential part of the technique of all my operations for complete tears, intending in this way to insure the bringing of the sphincter into the field as well as the exact union of its parts end to end.

Case II.—The next case was one of a secondary operation for complete tear where the parts had well cicatrized.

She was operated upon toward the end of February, 1898. She had a complete tear of the perineum in consequence of a forceps labor, conducted by myself in the preceding December. The immediate suture failed, and since that time she had had no control whatever over the bowel function. In place of the perineum there was a boat-shaped cicatrix, extending from two lateral prominences, marking the position of the fourchette back to the anus. The recently cicatrized tissue fairly marked out the extent of the original tear in somewhat diminished form. I proceeded by denuding the vaginal sulci and the lateral surfaces, as usual. I exposed the sphincter ends by turning down a triangular flap of uninjured skin lying in front of the anus (Fig. 4), catching the ends in their pits, one at a time, pulling them up and out a little, and snipping with blunt-pointed scissors on all sides

of the little eminence until each sphincter muscle stood out with perfect distinctness about 2 cm. beyond the surrounding tissue. On lifting the ends up the pull on the posterior part of the sphincter could be distinctly felt with the thumb and forefinger grasping the margin of the anus. The exposed ends were then denuded of the film of scar-tissue covering them and brought evenly together with interrupted catgut sutures. (Fig. 5.) The flap, which was turned down over the bowel during the dissection, was then brought up over the sphincter, as shown in Fig. 6, and the rest of the wound closed as usual. The result was a perfect control over the function of the bowel from the first, leaving nothing to be desired in respect to function, and the patient has now, a year later, absolutely normal control.

Case III.—In my next case I was obliged to follow a somewhat different procedure, as the sphincter pits were not well enough marked for me to be sure of their identity. After making the usual denudation I made two incisions parallel to the sides of the anus and extending downward from the denuded area about 1½ cm. on either side. (Fig. 7.) On pulling apart the tissues and dissecting inward, the sphincter muscle was then exposed, entirely freed from its bed, and the ends cut off. The rectal part of the tear was now closed by interrupted sutures on the rectal side down to the sphincter area, a short distance out onto the skin surface; the sphincter ends were then denuded and brought together with interrupted catgut sutures passed through them, after which the rest of the wound was united, as usual (Fig. 8), and the pararectal incisions carefully closed with interrupted catgut sutures.

Since then the following cases, given in abstract, have been operated upon in my clinic by Drs. Russell, Ramsey, and myself.

Case IV.—B. D., married, aged twenty-three years, white.

Diagnosis. Complete tear of perineum.

Operation. Restoration of ruptured rectovaginal septum.

The patient has been married five years, and has had two children and one miscarriage. The first labor was difficult

and instrumental; at the second the child was stillborn, while one month previous to admission the miscarriage had taken place at four months.

Ever since the birth of the first child, three years ago, she has had a descensus of the womb, with bearing-down pains in the abdomen, pain in the back, and headache, all of which symptoms have been worse during the past three months, the prolapse now being marked.

The bowels move regularly every day.

Examination under ether showed extensive tear of the rectovaginal septum, through sphincter ani and up left sulcus (forceps), the tear apparently extending one inch into rectum.

Operation by Dr. Kelly March 12, 1898: The usual Emmet denudation was made, and in addition the sphincter ends were dissected and pulled out on either side, 3 cm. on the right and 2½ cm. on the left, clear of all surrounding tissue. About 3 mm. of the ends were cut off to remove the white scar-tissue and to present an even muscular surface. The ends were then sutured directly together with four catgut sutures and dropped and buried.

The septum was first united down to the sphincter, then the sphincter united, then the remaining portion of bowel, and finally the vagina and the perineum. A silkworm-gut tension suture was inserted behind the sphincter ends, but not so far posteriorly as usual. Duration of operation, thirty-five minutes.

Convalescence was absolutely uninterrupted; the healing was *per primam*, and the result perfect. The patient had perfect control of the bowel from the first. Maximum temperature, 99.8° (second day). The patient was discharged, well, April 2, 1898.

Case V.—F. G., married, aged twenty-six years, white.

Diagnosis. Retroflexio uteri; tear of the perineum, extending through the sphincter ani.

Operation. Suspensio uteri; restoration of ruptured rectovaginal septum.

The patient, on admission, complained of pain in the blad-

der and misery in the back. She had been married seven years, had three children, and no miscarriages. All three labors were difficult. The first and second were instrumental, and in both of these the outlet was lacerated, with no attempt at subsequent repair. The last child was born two years ago.

The bowels were extremely constipated; she had hardly any control over them, especially as regards flatus.

Examination under ether showed the outlet greatly relaxed; complete tear of perineum extending through into the bowel, the sphincter pits being distinct on either side; uterus in retroflexion.

Operation by Dr. Kelly April 13, 1898: Denudation on sulci and on lateral walls of vagina as usual, extending down to rectum and laterally to sphincter pits; ends of sphincter dissected out and caught with forceps; rectum brought together in the usual way by interrupted catgut sutures tied on the rectal side; ends of sphincter muscle freshened and brought together with four catgut sutures. A deep silkworm-gut tension suture was inserted behind the sphincter ends; rest of closure in the usual way.

Uterus suspended in the usual way. Time of complete operation, seventy-five minutes.

The convalescence was marked by a partial breaking down of the perineal incision, with some suppuration; but the perineum was well lifted up, and introduction of the finger into the rectum showed good sphincter action, except anteriorly, while the patient seemed to have good control over her bowels. The maximum temperature was 100° (on the seventh day). The patient was discharged May 10, 1898.

Subsequent note, August 27, 1898: Result of perineal operation is fair; some bulging of anterior vaginal wall, and pressure upon it and upon the uterus causes discomfort. Sphincter ani has apparently its full power. Since leaving the hospital the patient has improved in general health and is free from her old trouble, except some pain in the back and painful micturition.

Cystoscopic examination showed that the bladder was inflamed and infected, especially about the region of the trigonum; while the urine showed a great number of pus-cells and a small amount of albumin.

Case VI.—L. E., married, aged thirty years, white.

Diagnosis. Complete perineal tear.

Operation. Restoration of ruptured rectovaginal septum.

Marital history. Married four years; two children and two miscarriages. The first labor, three years ago, very difficult, although not instrumental. The patient was lacerated and the laceration was repaired, but not successfully. The second labor, one year ago, was not difficult.

Since the birth of the first child she has had prolapse of the uterus after standing for some time, the uterus returning to its place when she lies down. Has absolutely no control over the bowels, and but little over urination. Feels as if bladder prolapsed with the uterus. The patient suffers with dragging pain in the back and loins. All these symptoms have been worse since the birth of her last child.

Examination. Complete tear through the perineum and sphincter-ani muscle, about one inch of the bowel being seen. Uterus in anteposition; low down in pelvis. Outlet greatly relaxed.

Operation by Dr. Russell April 28, 1898: Tear extends 3½ cm. beyond the sphincter in the bowel. Sphincter-ani ends were dissected out free; the mucous membrane was united above the sphincter by interrupted catgut sutures; the ends of the sphincter were then united directly with four catgut tension silkworm-gut sutures, going from side to side through the skin and the septum. The outlet was then restored in the usual manner. Time of operation, fifty minutes.

The convalescence was uninterrupted. The bowels were well moved on the fourth day. The wound healed perfectly. The sphincter ani has good power and the patient has perfect control of the bowels. The patient's maximum temperature was 100° (second and seventh days). The patient was discharged May 20, 1898.

CASE VII.—M. B., aged thirty-two years, married, white.

Diagnosis. Large retroflexed uterus with descensus; lacerated cervix; complete tear of vaginal outlet, with concealed tear of sphincter ani.

Operation. Trachelorrhaphy; restoration of ruptured rectovaginal septum; suspension of uterus.

Married thirteen years; has had three children and one miscarriage; all three labors were prolonged and very difficult, and the perineum was badly torn each time, the worst tear being at the last delivery, three years ago. None of the labors was instrumental.

Since the birth of her second child, six years ago, the patient has dragging and bearing-down pains in the lower abdomen, aggravated by walking or climbing, with progressively increasing loss of strength and loss of weight. Micturition has been increased in frequency, and is occasionally painful.

The bowels are generally regular, but since the birth of the last child she has difficulty in controlling the fecal movements whenever the bowels are loose.

Examination. Uterus is enlarged and retroflexed. The vaginal outlet is so relaxed that the cervix is visible. A tear is seen extending up the median line into the rectum, about 2 cm. in length. Slight lateral indentations indicate the possible position of the sphincter ends, and this is verified by palpation or stimulation. The sphincter contracts on all sides except in the front. The lips of the cervix are everted and congested.

Operation by Dr. Kelly June 18, 1898: Dilatation and curettage, with the removal of abundant endometrial débris. The lacerated cervix was repaired next, and then the vaginal outlet, including the sphincter ends. After the denudation of the wound area the sphincter ends were dissected and drawn out to the extent of 1 cm. Some scar-tissue was then cut off the ends to make them square and fresh. The rectal side of the tear was then closed with six catgut sutures down to the sphincter ends; the ends were then pulled out and held

so while a silkworm-gut suture was passed through the skin, through one sphincter end, across the septum, and out through the opposite sphincter end and through the skin again. The sphincter ends were then accurately approximated by three catgut sutures. The rest of the operation was performed in the usual way. The uterus was also suspended through an abdominal incision. Time of complete operation, fifty-five minutes.

The convalescence was absolutely uninterrupted; the healing was perfect; the vaginal outlet was well lifted up; the cervix in good position, as well as the uterus; and the patient has perfect control of her bowels. Maximum temperature 99.8° (third day). Patient was discharged July 16, 1898.

Case VIII.—E. N., married, aged forty-seven years, white.

Diagnosis. Multiple cervical polypi; polyp of posterior vaginal wall; rupture of rectovaginal septum.

Operation. Removal of polypi; amputation of cervix; repair of tear.

Marital history. Married at eighteen years, seven children (twenty-five years to five years). Always normal labors, and never attended by a doctor.

Menstrual history. For the past six months she has had frequent hemorrhages, until a few (five to six) weeks ago, since then no flow at all.

Associated with the hemorrhages were pains in the legs and pelvic regions, which have continued up to the present time, occasionally also having colicky pains in left hypochondrium.

Bowels have usually been regular up to the time of the hemorrhages, since which time they have been constipated.

Micturition has increased somewhat in frequency lately. Urine is negative.

Examination under ether showed the outlet gaping, complete tear of rectovaginal septum, sphincter pits being definitely marked on both sides, with a bridge of scar-tissue holding the ends of the muscles together; several cervical polypi; one polyp of vagina; uterus enlarged, but in ante-position.

Operation by Dr. Ramsay June 19, 1898: Removal of vaginal polyp; amputation of cervix with its attached polypi; the denudation of the complete tear was made, in the usual way, to the sphincter pits. The ends of the sphincter muscle were caught, drawn out, and dissected free. Catgut was used to draw together the bowel above the sphincter. The sphincter ends were then brought together with three catgut sutures, with a silkworm-gut suture through the muscle and the septum, to relieve tension. The closure of the rest of the wound was performed in the usual way. Time of entire operation, ninety minutes.

The convalescence was uninterrupted. The healing was *per primam*, while by rectal examination the sphincter-ani muscle could be felt contracting all around. The patient complained slightly of some pain in the left inguinal region, which was relieved by enemata of starch-water and fluid extract of hamamelis. The maximum temperature was 100° (second day). Patient was discharged, well, on July 20, 1898.

Case IX.—C. H., married, aged thirty-six years, white.

Diagnosis. Complete perineal tear; relaxed vaginal outlet.

Operation. Restoration of ruptured rectovaginal septum.

She has been married sixteen months, and has had one child, fifteen weeks ago; she was in labor three days, and the delivery was finally completed by instrumental interference, during which she was badly torn, both at the outlet and the cervix; an unsuccessful attempt was made to repair the septum.

Since the childbirth she has had severe pains in the back and pelvis, with partial loss of control of the bowels, especially marked when the movements are loose. As a rule, however, the bowels are constipated.

Examination under ether showed the outlet much relaxed, with a tear through the rectovaginal septum. Sphincter pits are easily seen, the one on the left side being pulled 2½ cm. from the position in which it is usually seen (apparently by the transversus perinei muscle). Uterus in anteposition and freely movable.

Operation by Dr. Kelly, June 27, 1898: On palpation sphincter-ani muscle felt easily posteriorly and laterally, but not anteriorly. A vertical cut, 1 to 1.5 cm. long, exposed the sphincter ends. The sphincter was dissected out, the ends pulled out to the extent of 2 cm., and splinted by a silkworm-gut suture passed through the muscle and left untied for the present. The vaginal wound was closed, doing away with the relaxation. The rectal tear was closed, and then the silkworm-gut suture was tied and the sphincter ends united by four catgut sutures, with two silkworm-gut sutures to perineum above, and the rest catgut, making good closure throughout. Time of operation, thirty-eight minutes.

The convalescence was uninterrupted until July 10th, when, on the removal of the external stitches, although the wound had apparently healed well, the sphincter held well, and the patient apparently had perfect control of the rectum, it was found that there was a rectovaginal fistula, the fistulous opening being around the internal vaginal suture on the left side, and in the removal of this a good deal of soft fecal matter oozed through the opening, through which a sound 3 mm. in diameter could be passed. This, of course, necessitated a second operation, which was performed on July 14, 1898. The sphincter was found to have held well. The fistula was just within the vagina, and opened into the rectum, about 1½ cm. within the anus. The sphincter was first dilated, and through the sphincter the rectal opening of the fistula was found; its edges were now pared and freshened on the rectal side; the vaginal side was then freshened in the same way. The rectal mucosa was closed with fine silkworm-gut sutures, with the knots turned in the bowel, and the vaginal opening was closed in the same way, with the knots toward the vagina. A rectal plug was then inserted.

The convalescence from the second operation was uneventful, except for the difficulty in moving the patient's bowels. Perfect healing took place, and the fistula was obliterated. The maximum temperature was 101.5° (sixth day after first operation). The patient was discharged on August 2, 1898.

The patient was readmitted September 9, 1898. She complained of pain at stool ever since her discharge from the hospital, with discharge of liquid material at times, the place seeming to heal for a day or two and then at stool to break down again.

Examination under ether showed the sphincter-ani muscle formed a complete ring around the anus, with normal radiating lines surrounding the orifice. There was a sinus slightly to the left of the median line in the perineum, opening just within the sphincter muscle, extending also 1½ cm. up in the rectovaginal septum.

Operation September 14, 1898: The sinus and the indurated tissue about it were dissected out. The opening in the rectum was enlarged by paring the edges, and was then closed by five catgut sutures passed on the rectal side. A few buried catgut sutures were also introduced on the perineal side. The perineal incision was then closed with interrupted silkworm-gut and catgut sutures. The convalescence was uninterrupted, the healing was perfect, and the temperature never rose above 99°, and the closure was complete. The patient was discharged October 7, 1898.

Case X.—C. C., married, aged thirty-eight years, white.

Diagnosis. Relaxed vaginal outlet; rupture of sphincter-ani muscle.

Operation. Dissection and direct union of the ends of the sphincter ani; resection of the relaxed outlet; curettage of cervix.

Marital history. Has been married fifteen years. Has had four children; no miscarriages. All the labors were extremely protracted and difficult. The first and fourth labors were instrumental. The third child was stillborn. After the birth of the first child she had convulsions. At her last labor she was badly torn, the tear extending to the anus, but no attempt at repair was made. Phlegmasia alba dolens complicated her last puerperium. The first child is fourteen years old, the last would be two years if living. The laceration mentioned above has never troubled her. The bowels

are perfectly regular and under control, while there is an increase in the frequency of micturition.

Examination under ether showed a tear of the perineum, through sphincter muscle and 1 cm. into the bowels; above, the ends of the muscle are widely separated and connected by a narrow band of scar-tissue. Cervix shows a slight bilateral laceration; uterus is of normal size and in anteposition.

Operation by Dr. Russell, August 1, 1898: The operation was performed in two steps:

1. A semi-lunar incision was made at the anal orifice at the junction of the skin and mucosa; the flaps were dissected back and the ends of the sphincter-ani muscle exposed. The mucous membrane was united by catgut sutures, and then the muscle ends were drawn together and sutured with five catgut sutures. The primary incision was then united from side to side.

2. The relaxed vaginal outlet was then resected in the usual way.

Time of entire operation, fifty minutes.

The convalescence was interrupted only by the inability of the patient to void her urine and the consequent necessity of catheterization for the first week, followed by a mild cystitis, relieved by vesical irrigations. The maximum temperature was 100° (on the second and eighth days). The wound in the rectum healed *per primam*. Perfect union of the sphincter muscle was obtained, with perfect control of the rectum. There was a slight infection of one of the vaginal stitches. The patient was discharged, well, September 1, 1898.

Case XI.—C. W., married, aged forty-three years, white.

Diagnosis. Complete tear of the perineum.

Operation. Repair of the complete tear, dissection, and direct suture of the sphincter ani.

The patient has been married twenty-three years, and has had six children, the youngest three and one-half years old, and one miscarriage, in 1890.

She was badly lacerated at her first confinement, where the delivery was instrumental (twenty-two years ago). This was

repaired by Dr. Helmuth in 1891, and the perineum was ruptured again at the birth of her last child, three and one-half years ago.

She complains of general poor health, frequent attacks of diarrhœa, and especially of an escape of gas from the vagina. She has also noticed fecal matter in the vagina, and often has great difficulty, and sometimes entire inability, to control the movements of the bowel.

Examination shows that the vaginal outlet was torn through and the sphincter ends widely separated. The perineum is boat-shaped, with much scar-tissue between the vaginal and rectal openings, and the injury to the sphincter ends might easily be overlooked. The sphincter ends are marked by pits 2 cm. apart.

Operation by Dr. Kelly, November 22, 1898: Denudation as usual, removing scar-tissue over sphincter ends and freshening the torn septum and extending up both right and left vaginal sulci. In including the sphincter ends the incisions marking out the area for denudation were made differently from the rule by cutting about 3 mm. away from the pits. This was done so as to give the sphincter a wider berth, and so that when the sphincter ends were united by buried sutures they would not lie so close to the skin surface as they would if the incision was made close to the ends; both sphincter ends were caught with forceps, pulled up, and dissected out with a pair of blunt scissors until they appeared about 1½ cm. long above the surface. The glazed white ends were then cut off and the rest of the denudation completed, and the bowel above freed from the rectovaginal septum. The rectal rent was then closed by fine interrupted silk sutures, passed on the rectal side, entering and emerging on the mucosa about 1 mm. from the margin of the cut.

After closing the rectal rent the sphincter was united by two catgut sutures and by a silkworm-gut suture, entered about 1½ cm. back of the edge of the cut, in the anal margin, and carried up through the septum, piercing the sphincter both on entering and emerging. Another suture was passed

well behind this first one, up through the septum outside the sphincter, as recommended by Emmet.

The skin margin was very carefully closed up over the sphincter and the rest of the wound in the vagina and perineum united as usual, taking extreme care not to leave any dead spaces.

The intelligent patient had perfect control over the sphincter from the first, and at once recognized the great difference in her condition.

She made a prompt recovery, and returned home entirely well.

The one remarkable and constant fact especially noted after each of these operations was the immediate sense of restored power, which was noted by the patient as soon as she was well over the effects of the anæsthesia. There was a sense of natural control over the function of the bowel, which had been absent since the injurious confinement.

In conning the literature of this subject I have discovered several interesting references which have a direct bearing upon the method described. In the first place, Dr. R. L. Dickinson[1] has pointed out, in an admirably clear paper devoted to the study of recent injuries to the sphincter ani the important fact that the rupture of the muscles crossing the pelvic floor, in common with the external sphincter, is never median. The tear takes the direction of least resistance, and avoids the aponeurotic web where the structures interlace in the middle line, and breaks through laterally, severing the transverse perineal muscles and the sphincter well to one side; out of sixteen cases, ten were on the right, six on the left, and one involved both sides of the sphincter. A close examination will always reveal an asymmetry, and not infrequently one end of the sphincter is found hanging out free on one side of the rupture, while the opposite side presents a deep pit from which it has been torn out, and at the bottom of this pit is the other sphincter end. With the changes

[1] American Gynecological and Obstetrical Journal, May, 1895.

which take place during the period of cicatrization and contraction, well delineated by Kuestner and Leopold, this asymmetry is reduced to a minimum, so that there finally remains but a slight obliquity in the level of the sphincter ends as a small index of a large difference earlier in the history of the case.

In these recent tears, Dr. Dickinson, with good surgical judgment, used buried catgut sutures to bring the sphincter ends together. He says: "Two buried catgut sutures carried through the free, hanging end of the muscle, and then down into the pit to catch the hidden end, draw the parts into accurate apposition. The rest of the injury is then repaired as usual."

Sawaisky, in an inaugural dissertation, published in St. Petersburg, 1895, describes a method of treatment employed in Prof. Lebedeff's clinic in six cases of complete rupture. The rectovaginal septum was first split as in performing a flap operation, and then after extending the wound sufficiently up into the vulva the ends of the sphincter were caught and united with an interrupted suture, after which the major part of the wound was closed with a continuous catgut suture, and the closure was completed with four deep and two superficial sutures.[1]

In an article by Leopold and Wehle,[2] a method of uniting the suture is described by which two or three sutures are passed through the skin close to the sphincter, brought out in the sphincter pit, and re-entered on the sphincter on the opposite side, to reappear on the skin surface at a point corresponding to the point of entrance. By this means the suture ends are approximated with far greater accuracy and with a degree of certainty unknown in the old operation.

Dr. George E. Shoemaker, in a personal letter received January 14, 1899, states that he operated upon a tear of the sphincter-ani muscle in June, 1893, which was referred to briefly in the *Medical News* of September 22, 1894. Two

[1] See reference in Frommel's Jahresbericht, vol. vii. p. 202.
[2] Geburtsh. u. Gynak., 1895, Band ii. p. 307. Leipzig.

previous operations—both unsuccessful—had been performed on the patient for the same trouble, which had originated in 1891. Dr. Shoemaker's operation was begun by making a curved incision from over one sphincter end across to the other. The sphincter muscle ends were then dissected out and clearly defined, after which they were caught up by a strong catgut suture, which included only the two sphincter ends. The rectal wall was closed in the usual way and the intravaginal denudation completed, two reinforcing wormgut sutures being passed through the sphincter, each beginning far out on the skin at the side and ending at a point opposite.

The operation was entirely successful, and the patient secured perfect control of the bowel.

Since this operation Dr. Shoemaker states that he has used this method repeatedly, with entire satisfaction.

In a brief but suggestive paper Dr. R. G. Le Conte[1] describes the direct suture of the sphincter ends by means of a buried catgut suture passed after the fashion of a tendon suture; the sphincter ends are hooked up and drawn forward and freshened, either by cutting off a small portion with the scissors or by fraying the ends well by a knife, as already advised by previous operators who have insisted on freshening the sphincter ends as essential to secure good union. Two catgut sutures are then applied, one on each side of the sphincter muscle and two more on the opposite side. When the opposite sutures are tied the sphincter ends are approximated. Dr. J. M. Baldy successfully carried out Dr. Le Conte's suggestion upon a patient who had been twice previously operated upon, with an unsuccessful result each time.

My own method of treating the sphincter is similar to those detailed, in that the muscle is united directly end to end by means of interrupted catgut sutures, and I would prefer passing the suture directly through the muscle to the use of a tendon suture, for the reason that the simple interrupted

[1] American Journal of Obstetrics, June, 1895.

suture buries less foreign material, and it is therefore less liable to infection, lying, as it does, close under the skin.

The essential points of difference are a carefully conducted denudation, giving the sphincter a wide berth, so as to separate it from the skin surface, after all the parts have been brought into apposition, by a greater interval. This is done to make the burial of the catgut sutures a safer procedure.

The next important point is the dissection and liberation of the sphincter ends until 1 or 1½ cm., or even more, is pulled out free on each side. This has not been proposed before. The ends are then cut off, so as to remove the scar-tissue, and three interrupted catgut sutures passed through them, so as to be ready to bring them snugly together at the proper time.

The rectal wound is then completely closed by a series of interrupted sutures passed close together, so as to make it impossible for any minute particles of fecal matter to press between the stitches and cause an infection. This closure is carried down and over the anus on to the skin area, and then only after this step is satisfactorily completed are the sphincter ends brought together and the buried catgut stitches tied. Another point which I wish to urge, which differs from any previous proposition, is the passage of a silkworm-gut tension suture directly through the substance of the sphincter muscle half-way between its outer and inner borders. The purpose of this suture is to take the tension off from the buried catgut sutures during the healing process. I prefer this suture to the Emmet tension suture, which is passed well behind the sphincter ends on the skin surface, because my suture acts more directly and does not tend to make the anal orifice so small. It is, therefore, easier to secure earlier and regular defecation.

I have dwelt thus far upon the method of securing immediate union of the external sphincter muscle. It is my desire now, in conclusion, to insist upon the importance of paying equal attention to securing accurate approximation of the internal sphincter muscle. Indeed, if I would establish any comparison between the two, I would attribute more impor-

tance to the accurate union of the internal sphincter than to that of the external. This must be effected in the following manner: One or two fingers are passed into the torn bowel and the thin septum is brought slightly forward, while with a knife or a pair of scissors the operator splits the septum on its mucous margin, and then dissects upward and inward, separating the vagina and the columna from the septum in such a way as to isolate the rectum in front and on the sides and to turn the remaining tissues upward. By taking a little care, and observing the tissues closely, the bowel, with the muscle, is easily set free; and if the dissection is well done the internal sphincter fibres will be recognized on both sides.

After all the scar-tissue is removed the internal sphincter is then united by a series of interrupted fine silk sutures entering and emerging on the mucous surface of the bowel, about a millimetre from the edge of the cut. These sutures are passed and tied from above downward, from $1\frac{1}{2}$ to 2 mm. apart. In a case recently operated upon I used as many as sixteen of them before the bowel was closed down beyond the external sphincter.

I believe it is best to reinforce the sutures by two or three buried catgut sutures, grasping the muscular coat of the bowel—that is to say, the internal sphincter—and drawing it together over the line of union. After doing this the external sphincter is brought together as described above, and the remainder of the wound united as described in the text-books.

The utmost care must be taken throughout not to leave any dead spaces about the buried sutures.

After such an operation it is my practice to keep the bowels open, by giving, at least every other day, a warm oil injection through a soft catheter.

DISCUSSION.

Dr. George H. Noble, of Atlanta, Ga.—I can bear testimony to the usefulness of stitching the sphincter together with buried sutures. I have been under the impression that it was quite commonly practised, as it has been my custom for a number of years, and some of my friends have followed me in it.

About nine years ago, in the Kings Daughters' Hospital of Atlanta a physician using an axis-traction attachment on a Simpson forceps lacerated the perineum into the rectum (anteriorly), but the sphincter muscle gave way in the rear of the anus and not in front, as it usually does. The left half of the sphincter ani pulled out of its sheath, so that it presented the unusual appearance of the muscle projecting an inch and a half from the right side, and the empty sheath on the left extending to the median line in the rear of the anus.

Not wishing to sacrifice half of the muscle, a suture was introduced through an incision in the skin, then through the undisturbed end of the sphincter posterior to the anus, and brought out through the empty sheath, then transfixing the free or disengaged end of the muscle, after which it was returned in the reverse direction and tied under the surface of the skin behind the anus, thus drawing the disengaged end of the muscle into its sheath and uniting with a buried suture.

Once again in the same year I closed in the same manner a second laceration of this peculiar form that was caused by the same instrument in the hands of the same party.

Since that time it has been my practice to use the buried suture in approximating the ends of this muscle.

Dr. Kelly advises clipping with scissors around the ends of the muscle for the purpose of releasing it from its bed of cicatricial tissue. This is not as satisfactory as a method that I have been using for the last two or three years.

After paring off the lacerated surface catch up the mass of scar-tissue over the end of the muscle, as illustrated by Dr. Kelly, and make an incision on the upper surface of the muscle and parallel to its fibres, cutting into the sheath. The end of the sphincter is easily drawn out with a pair of forceps.

The mattress suture is preferable; it turns the ends in better,

it can be made to tuck the tip of the muscle downward in the direction of the centre of the ring formed by the muscle, instead of puckering upward, as sometimes happens in the Emmet operation. When one or two simple sutures are used it is better to pass them through the sheath unless it has been destroyed too far back from the line of laceration, for slight eccentric pressure at the anus will suffice to force the threads to slip between the fibres and pull out.

The results have been uniformly successful, and no inconvenience has been experienced on the part of the patients.

Formerly it was my habit to stitch the levator ani and sphincter vaginæ together with catgut or other buried sutures. The results were excellent so long as the sutures would last, but in the course of a year they would separate, and the resulting condition was no better than that secured by Emmet.

In making a comparative study it occurred to me that it is just as important to unite the fascia in the perineum as it is to approximate the transversalis fascia in the abdomen. So I set about learning a means of easy dissection of the fascia. This proved a vexed problem, as the conditions in different cases are so varying. In central laceration not implicating the rectum it is comparatively easy. In deep, lateral tears it is harder, and if of long standing the fascia retracts so much upon the side torn that it requires skill, patience, and knowledge of anatomy; but certain landmarks which I shall point out in a paper at the Medical Association of Georgia next April will facilitate the work greatly. The object to be obtained is to put the strain upon the fascia which gives to the perineum its strength or power of resistance. Its closure layer to layer with buried sutures is just as important as that of the abdominal incision, for it is subjected to greater pressure during confinement.

The tension sutures of silver wire should take in a great deal of tissue, but very little skin. The muscles and fascia should be drawn well out with volsellum forceps, and the needle passed about half way to the rami of the pubis and ileum, so that the loop of wire includes four to six times as much tissue as when used in the ordinary way.

These patients have very little pain, and, as a rule, do not require morphine. If they take any it is usually an eighth or

a fourth of a grain immediately after recovering from the anæsthetic.

Dr. J. Wesley Bovée, of Washington, D. C.—I have followed this plan of dissecting out the sphincter muscle for some years, and it is the only way to get satisfactory results. I usually precede it, however, with a thorough stretching of what is left of the sphincter muscle. I grasp the sphincter muscle with the index finger and thumb of each hand, separating them as well as I can and stretching this muscle or what is left of it its whole length. We sometimes find that if this is not carefully done we make some abrasions over the posterior surface of the mucous membrane; but if we are careful we do not do much damage in that way. In many cases the muscle has been ruptured for so many years that it is very much atrophied, and it is difficult to reach in there and dissect up well the muscle. This being the case, I have contented myself in many cases by merely suturing some of the newly formed tissue over the ends of the sphincter, not cutting it off and not bringing muscle to muscle, leaving some new tissue or fascia drawn over the ends to come in the median line in front. I suture the rectal surface with continuous catgut, sometimes with interrupted catgut. I use nearly always catgut for perineal surgery, and bury it. It is not always buried in the vaginal wall, but usually it is, so that when I finish there is not a particle of suture material that shows in any place. I never yet had a case of infection of the perineum, and I have done hundreds of these operatoins. Infection of the perineum from the bowel is an overestimated quantity. My patients have no pain after the operation. I have the bowels move daily, and I must say I am as well pleased with my perineal surgery as I am with any other class of work that I do.

Dr. Haggard (closing the discussion on his part).—I have been very much interested and instructed by the very pleasing manner in which Dr. Kelly has described this new method of his. We are accustomed to look upon all of his productions with so much interest that anything emanating from him should receive our undivided attention. He has beautifully illustrated this method, and has presented it in a logical manner. The only trouble is that these methods are not so easy sometimes as we would like. I imagine that is going to be the difficulty with

this operation, but I am sure the doctor must be pleased to know that others have been pursuing the same line of work. Personally, I have seen a good many of these classical restorations of the sphincter ani with silver wire. If done properly the results are as good as they can be, and it occurs to me that it is hardly necessary to go into more elaborate dissections. If we can accurately pull up the dimples, nip off the scars over the sphincter ends and approximate them with silver wire, nothing will hold better. It is thoroughly clean; it will not cut out, and I believe with this procedure we will have a larger percentage of ultimate recoveries than by this method, which is confessedly risky from the mere fact of bowel contamination.

In regard to catgut, I am glad to know that others get better results with it than myself. Of course, if it is buried in gland tissue it is not going to cause suppuration, but the difficulty is in burying it. Do you use silkworm-gut to cover the mucous membrane?

Dr. Bovée.—I bury the suture under the vaginal mucous surface.

Dr. Haggard.—It is a sort of mattress suture. If that can be done I dare say it is very easily accomplished, but certainly not so to those who have been accustomed to use silver wire. I do not question the utility of exposing the sphincter ends; it is the only method in which we differ. Like everything else, that which in our hands gives satisfaction we find no reason for changing; but surely this new procedure offers very many points of advantage, particularly in the cases which Dr. Kelly mentions, namely, the imperfectly united ones.

Dr. Kelly (closing the discussion).—I agree with what has been urged, particularly with Dr. Haggard's views, and I recommend this delicate operation only to those who are well trained in plastic work in this part of the body. I do not use mattress sutures, but when I wish accurate linear approximation use simple interrupted sutures which bring the ends evenly together.

I hope the publication of the cases by Drs. Bovée and Noble will follow speedily this discussion, as I think it is a matter of importance, and if there is any credit I shall be only too happy to share it with my friends.

FRACTURES INVOLVING THE ELBOW-JOINT.

By J. T. Wilson, M.D.,
Terrell, Texas.

Fractures involving the elbow-joint are of great interest, and always cause more or less anxiety because of their liability to anchylosis—partial or complete—to deformity, or to some interference with the perfect function of the joint as a result.

Fractures in this vicinity, *without the capsular ligament*, are not so grave, are under better control, give more satisfactory results, and cause less apprehension. Fractures *within the ligament* are always more troublesome, give rise to more inflammation, demand greater care in their reduction, in the dressing and in the after-treatment. There is always anxiety and doubt, and frequently the result is not what we would like to have it; especially is this sometimes so in a refractory patient. Anchylosis, in various degrees, is generally looked for when union has taken place. It is extremely difficult in many cases to avoid this result; but with care, patience, and perseverance on the part of the surgeon and patient, this complication can be remedied, wholly or in part, in nearly all cases. If we will remember that this is a complicated joint, and have the natural anatomical relations of the part well in mind, our management of the case is likely to prove more successful.

It is well, too, for us to have in view the fact that in a majority of cases the lower end of the humerus is the part that suffers from fracture at or near the joint, either a supra-condyloid fracture, or separation of the condyles—one or both.

If there should also be a fracture of the olecranon process

of the ulna, or that rare condition of fracture of the coronoid, it would greatly complicate matters, and make it much more difficult to handle.

It is necessary to remember that the muscular attachments to the region around the joint are very great. It is difficult to conceive of a fracture here where the fragments do not involve a muscular attachment, and are more or less displaced by it. Three great muscles of the arm are inserted into the process of the heads of the bones of the forearm, which help to form this joint, which from their functions and strength exert an influence in almost any fracture involving the joint. Five muscles of the forearm arise in part from the internal condyle of the humerus; except the pronator quadratus, all the anterior or flexor and pronator group take their origin from this condyle; in the radial region, all the extensors and supinators arise, in part at least, from the external condyle and ridge of the humerus. A knowledge of these attachments is sufficient to indicate the difficulty of confining the broken bone in apposition. In fractures of this joint there is necessarily considerable inflammation ensuing, the cartilage of the articular surface being wounded, and the investing ligaments lacerated. The amount of callus thrown out is considerable; it hinders motion, and is generally slow of absorption.

My experience has taught me that in these fractures, in order to get the best practical results, it is of supreme importance to keep the parts at absolute rest. To do this it is necessary to keep the patient in a quiescent state. It is impossible to give the joint that rest so necessary if the patient is permitted to be up and stirring about. Unless he is confined to bed the injunctions of the surgeon will not be heeded; therefore, for the first few days, or a week, the bed is the best place. It also gives the system an opportunity to recover from the shock incident to the accident.

With the proper precautions, a fixation-dressing is applied at the very beginning of the treatment. The position of the forearm is a question that has elicited much discussion and a variety of opinions. Eminent surgeons differ greatly upon

this subject. Many place the forearm at a right angle with the arm, and others put it in a position of extension; some arrange it in a prone position, and others in a position of supination. In all of these positions good results are reported, and some unfavorable also. Either extreme strikes me as being irrational. Of course, some untoward results must be expected, no matter what the position or dressing.

The different fractures and the different degrees of fracture require different positions in pronation or supination, and different angles of the forearm. I have been guided in recent years, after the reduction of the fracture, by the rule of placing the forearm in that position which seems to favor best the coaptation of the fragments and the relaxation of the muscles, giving the least deformity, and the flexed position has been the one generally employed.

The arm-joint and forearm are scrubbed as thoroughly as the circumstances will admit, with soap and boiled water; the soap washed off, then the parts bathed with alcohol and rubbed gently but thoroughly until dry. Then the diagnosis is made, if possible, and the dressing applied under an anæsthetic, if necessary, and I generally find it necessary. After placing the arm in a suitable position, relaxing the muscles, and bringing the fragments together with the least deformity possible, it is given into the hands of an assistant, who holds the bones in place; a firm pad of sterilized gauze is placed in front of the joint opposite the broken fragments. I place some stress upon this pad, as it aids in keeping the fragments in position, if of suitable size and properly placed. It should be thick enough for a firm support, but not so thick as to interfere with the functions of the splint, and in most cases a spiral reversed roller is applied from the hand to the axilla.

Many surgeons reject this bandage as being useless and interfering with the splint; but I prefer to use it. It controls muscular action, is a good protection to the limb, and assists in holding the parts in place; if nicely applied it adds comfort, and does not interfere, in my judgment, with the splint performing its proper function.

The anterior splint is then put in place—one with a ratchet hinge, much like the one of Dr. Agnew, which can be placed at any angle desired, and made to extend from near the wrist to above the insertion of the deltoid. A pasteboard trough is then moulded to the posterior surface of the arm and forearm, extending from the axilla to the ends of the fingers, and both are confined by a roller. The patient is put to bed for at least the first week—longer if necessary—depending upon his disposition and the extent of the injury. If fairly comfortable, and no contraindication arises, the dressing is not disturbed until the third or fourth day, when it is removed carefully, with the aid of an intelligent assistant, to prevent displacement of the fragments. If the inflammation has subsided sufficiently, the correct position is maintained by the anterior splint firmly applied, a carefully moulded plaster-of-Paris trough is fitted posteriorly. This must be adjusted nicely in order to support the fragments, keeping them in place posteriorly and laterally. This plaster mould should also extend from the axilla and support the hand, and should not be too heavy and cumbersome, which is a serious fault with many plaster dressings, but firm enough to thoroughly fix the joint and arm. This can be done by having some strips of heavy gauze or cheese-cloth, measured by the sound arm, and carefully cut to the proper size; the plaster is thoroughly rubbed in these, and they are applied—the arm being well protected—layer by layer, a solution of the plaster rubbed in between each layer until the thickness desired is secured. While this is being done, the arm and forearm is maintained at the proper angle, and the fragments are held in place by the anterior splint, which has been secured by a roller—an assistant steadying the arm—and the whole is supported by an outside roller. This dressing can be controlled at will, and if nicely applied, is not so cumbersome as it would seem. If it becomes desirable to change the position or angle, the plaster trough can be taken off by simply removing the roller, the position changed, and a new trough applied.

I prefer to have the anterior splint made of wood, broad

enough to cover the joint, and yet not extending quite to the ends of the epicondyles, the joint fitting closely down to the bend of the elbow, the ratchet notches changing not more than the eighth of an inch at each movement. If properly made, this splint is light enough, and yet firm enough for all practical purposes, and much of its usefulness depends upon its fitting well. If extension and counter-extension become necessary, the plaster splint can be moulded so that it will extend up under the axilla, and the anterior splint will make sufficient counter-pressure by means of the roller. This gives a firm, fixed dressing, keeping the parts at rest, so necessary in all inflammatory conditions of the joints. If the fragments have been thoroughly replaced and kept in apposition, there ought to be in most cases very little trouble.

The patient should be seen frequently, and the joint examined at any time when there seems to be an indication for it; this should never be done, however, if there is no special indication for it after the permanent dressing has been applied, and the surgeon feels satisfied that the fragments are in place. I believe that the old practice in removing the dressing and instituting passive motion on the seventh or eighth day is capable of great harm. It seems to me that it rekindles the inflammatory spark that is yet smouldering, and sets the fire of mischief to burning anew, thereby increasing the danger of troublesome anchylosis. The fractured parts are not yet firmly enough united to withstand the force necessary to break up strong adhesions of the joint if any exist. Great care is demanded in the attempt to break up these adhesions, which at this stage is best done gradually. Violent motion in the early stages of repair is not productive of good results. Gentle motion, frequently repeated and persevered in, will often accomplish more than sudden forcible separation with the shock attending it.

If the fragments have been kept well in place, and the joint at complete rest, the danger of permanent anchylosis is not great. After three or four weeks the dressing can be removed, the joint examined with care, and passive motion

gently instituted; if there is much pain it may be necessary to give an anæsthetic. This will also relax the muscles, and the danger of causing severe inflammation by rough handling or refracturing the parts is not so great; if only fibrous bands exist they can be broken up. I always favor anæsthetizing the patient at the first examination, if any considerable degree of anchylosis exists, and in subsequent manipulations if much pain is caused.

Rubbing and systematic massage are of great value. If the stiffness is not readily overcome, efforts to do so should continue, and after five or six weeks have passed the patient is to be instructed to take gentle exercise, not violent, twice daily, with Indian clubs and dumb-bells, neither of which should be heavy. He is advised to use the hand and arm constantly, and in time, in the great majority of cases, he will be rewarded with success. In some cases the improvement may take place many months before the function is restored, and it sometimes comes on so gradual that its progress is almost imperceptible. If there are several fragments of bone, and some of them so small that a good apposition cannot be maintained, it would be better to remove them entire, thus saving time and trouble, and giving a more favorable chance for a better joint. If the sharp ends of a fragment pierces the ligament, it may prove very difficult to return it to its place within, and the reduction may be only apparent, the ligament intervening, which is liable to cause trouble.

If anchylosis has supervened upon a fracture, and many months of patient effort at restoring the functions of the joint proves futile, an operation is justified; if a fragment of bone is causing the trouble, it can be removed. A resection will often give a good, useful joint.

DISCUSSION.

Dr. A. M. Cartledge, of Louisville, Ky.—Mr. President: I have enjoyed the paper of Dr. Wilson very much. Fractures of the various bones of the body have given me considerable

trouble, and particularly fractures about the elbow-joint, not only with reference to their correct diagnosis, but their treatment. I am very much interested in the method suggested by the essayist, in that it impresses us with the use of plaster-of-Paris. I have never used plaster very much in fractures of the elbow-joint. The greatest objection I have found to it is its liability to displace the fragments by the least turn of the dressings; but by applying it in the manner described by the essayist, one can appreciate its usefulness. I have resorted to rather frequent change of dressings within the first week, to correct the great tendency to vicious displacement of the fragments in many cases. I do not speak simply of T-fracture or one in the lower third of the humerus, but simply of those fractures that are irregular and cannot be easily classified, with one of the condyles partially broken off, and the shaft with the other condyle broken, perhaps, in several fragments, with an uncontrollable tendency to displacement of the bones of the forearm. In such cases I have used sole leather, putting it on wet, and after it has become dry taking the shape of the limb by slipping it off, and see if the position is all right. If not, I re-correct it. I put it on again. This subject is a very important one.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—From the general stand-point of the surgeon I cannot agree with the essayist or with Dr. Cartledge in regard to their plan of treatment of these fractures. While in the majority of cases an anterior, a lateral, or leather splint may meet the indications in the treatment of these fractures, yet bad results will follow simply because we displace the natural resting-place of either one of the condyles which has been fractured. If the carrying function of the arm is pronounced, or if there is a fracture of the internal condyle, deformity is much greater. If we have a fracture of the external condyle and attempt to treat it by one of those splints, more or less deformity will necessarily result, so far as the future use of the carrying function of the arm is concerned. After all, when we come to the treatment of these fractures by the application of splints, they should, as far as possible, preserve the carrying function of the arm so far as its relation to the other arm is concerned. In hundreds of cases that have been examined the carrying function of one arm bears a corresponding relation to the carrying function of the other arm, so

that in replacing the fractured bones we do not follow any arbitrary rule after we have effected reduction, which is necessary with a lateral or anterior splint. When the condyle is displaced, we cannot easily determine the relation by the correspondence to the olecranon process, because it has a different relation, quite pronounced. The carrying function makes no difference in the anatomical relation of the three bones upon which we so frequently depend. To treat a fracture of the elbow-joint in the manner described would result in as many failures or just as many bad results as we have in cases that show a pronounced lateral deviation of the forearm from the arm.

Now, with reference to the position of the arm in which you treat it. I agree with the essayist that neither pronounced extension nor pronounced flexion is the proper position to treat these bones. Pronounced flexion or extension will produce a great amount of irritation, whether from nervous causes or from tension of the ligaments, or the capsule which surrounds the joint itself. (Here Dr. Westmoreland illustrated the most comfortable position in which to treat a fracture of the elbow-joint to prevent anterior displacement and subsequent deformity.) I make it a rule in any injury involving the elbow-joint to put the patient under ether. When the patient is under ether I am able to make a careful examination and to more readily arrive at a conclusion in regard to the character of the fracture and to put it up without any movements on the part of the patient, and any one who has had to put up a fracture of the condyle in the case of a small child with a flat arm knows how difficult it is to arrive at a definite conclusion in regard to it. Frequently we are not able to make a positive diagnosis to treat it in that position and, with a plaster-of-Paris splint, preserve the anatomical conformation of the arm, changing it in about a week after the swelling has gone down. And I think splints ought to be changed frequently, because by so doing we get better results.

Dr. Louis McLane Tiffany, of Baltimore, Md.—I cannot agree with one or two points brought out by the essayist, particularly in regard to the details of the treament of these fractures. I consider a fracture of the elbow-joint very much as I do an injury of the spine; it is a fracture-dislocation. I scarcely think I can make a correct diagnosis of a fracture of the elbow-joint unless I see the case within a few minutes after the injury,

for swelling takes place rapidly; one condyle or the other is more or less displaced, and with it the corresponding bone, the radius or the ulna, is displaced. Fracture-dislocation is the proper term to use.

In the matter of diagnosis it is my custom to anæsthetize the patient. I always put the arm up in acute flexion, and I do not look at it for a week. If everything is in good position, I leave the patient for a month. I immobilize the arm in an acute flexed position, letting the patient get up as soon as the splint is firm. If I have a board, and can make a splint which is firm, by the next morning the individual is allowed to get up.

Injury of the elbow-joint is common in childhood. An anchylosed elbow-joint in man is extremely rare. I believe the result obtained by the surgeon is attributable more to the age of the patient than to the treatment. An injury of the elbow-joint in adult life is usually followed by diminished usefulness of that joint; there is more or less anchylosis. On the contrary, the child will have a good arm when he grows up. I am, therefore, one of those who believe that in fracture-dislocation of the elbow-joint the arm should be flexed at an acute angle, put up stiff, and kept so for a month, and the child will have good use of the arm when it grows up, while fracture in the adult will be followed by diminution in function.

I did not understand the doctor in his paper to say anything in regard to the character of the fracture, whether it was opened or closed, whether simple or compound. In cases of compound fracture I always find it necessary to enlarge the incision, and I do not hesitate to trim the bone away wherever it is necessary; to wire fragments together; to sew the periosteum together; but I always take away enough bone to be sure that the bones shall come together easily in what I believe is the proper position. Of course, I am talking now about adults. When I take the arm out of the splint I tell the patient whatever is necessary for him or her to do. I do not need to make passive motion in the cases of children. If it is a boy, I recommend driving a pony. This will pull his arm out straight in a short time. If a young woman, I recommend the use of a trapeze or a pair of rings, one ring being at a different level from the other, so that, in exercising, in the course of time the arm comes out straight. In children outlandish-looking elbows will have excellent function, sooner or later.

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Dr. Westmoreland.—Have you ever noticed any difference in the length of the humerus after the removal of the condyle in young children?

Dr. Tiffany.—I have never measured the humerus in young children, to compare it with the other side after a fracture of the elbow-joint. As to the carrying function—that means the angle, I take it, between the humerus and the forearm—I do not think that makes any difference. A person will carry a pail of water if the arm is not anatomically correct.

Dr. George A. Baxter, of Chattanooga, Tenn.—I tried Dr. Tiffany's plan of treatment in the case of my own boy, who broke his arm. I gave him passive motion, and the arm was restored. These fractures have to be treated in different positions when there is complete luxation of the muscular attachment. In the case of a T-fracture or Y-fracture, or a fracture of the olecranon, almost the full, extended position is the favorite with me, with the coronoid process in acute flexion, and these positions I assume.

I believe, with Dr. Tiffany, it is a difficult thing to make a correct diagnosis in these cases. I do not believe it can be done three or four hours after the injury without complete anæsthesia, and even then we find it difficult to make an absolutely correct diagnosis. I trust a good deal to position and to absolute physiological rest during the period until consolidation of the fragments has taken place, more or less examining them, then putting on a Bavarian splint, a leather splint, or have the plaster splint cut so that I can open it for proper examination of the parts and frequent adjustment during the period of consolidation. After consolidation has commenced I begin gentle, passive motion, keep it up every day until there is considerable latitude of motion, and then you can encourage the patient, if he be a boy, in his play to bowl rocks for the restoration of it. He must have considerable latitude, or it will prevent him from accomplishing what you would accomplish in spite of the thing. There is one point with reference to passive motion that I wish to call attention to, and that is as soon as pain commences they stop exercising, and there is no further accomplishment of motion. The surgeon proceeds with passive motion until there is a certain degree of pain, and it takes months to restore the function of the arm, even though there will be little motion in it at first, and the child will accomplish as much in eighteen

months without it. I believe in passive motion as soon as sufficient consolidation has taken place, or as soon as the inflammatory action has subsided and sufficient consolidation has taken place. I begin passive motion, and keep it up until function is restored as good as it possibly can be.

Dr. W. B. Rogers, of Memphis, Tenn.—Thus far in the discussion there is unanimity of opinion that fractures of the elbow-joint are difficult to diagnose as well as to treat. I do not confine myself to any single method of treating fractures involving the elbow-joint, nor is any single fracture to be treated in such a manner in all cases. There are generally more complications than simply a fissure of the joint in these fractures. The violence that produces it is rapidly followed by a great deal of swelling, so that in order to make a correct diagnosis I find it is necessary to put the patient under an anæsthetic. I never feel that I know what the damage is until I have anæsthetized the patient and examined every bony prominence. After some hours have elapsed the tension is so great, even under an anæsthetic, that an exact diagnosis cannot always be made.

The essayist confined his treatment to fractures of the lower end of the humerus, though his paper would include fractures of the coronoid process as well as of the olecranon. A fracture of the olecranon should be treated differently from a fracture of the shaft of the humerus. As a rule, I have employed a trough splint to the back of the limb, but in some instances I have been led to use two lateral splints, made by encasing the arm and forearm in plaster-of-Paris, and then, as it was drying, moulding the fractured parts together, then splitting down the front and back, taking it off in two lateral halves, then trimming off a little of the splints, which should then be reapplied and bandaged tighter and tighter as the swelling subsides. Where we have a fracture of one condyle only the anatomical conformation of the joint is such that when the limb is extended and the other condyle is intact, and the forearm is put in the proper relation to the arm, then the other fractured condyle is more readily put in place and kept so, according to my idea; and yet where both condyles are fractured I have found a trough splint, with pad anteriorly, to be more satisfactory. I must confess that I have seen few entirely perfect joints after fracture. There is always some catch or hitch, varying in degree, for months afterward.

I do not believe in putting these fractures up in plaster-of-Paris and leaving it for some days. I think the splints ought to be taken off at the end of forty-eight or sixty hours and the parts examined again, because the swelling is so great that we cannot apply a splint sufficiently firm or snug-fitting to last very long when the swelling begins to subside. I believe in movable splints and frequent examinations in the early part of the treatment of these fractures. I do not hesitate, after four or five days or a week, to steady the fragments upon the shaft of the bone and have an assistant straighten the arm out gently, to see if there is proper gliding movement, independent of any movement of the fragments. Passive motion in cases of anchylosis is all right and proper, but after the soreness has subsided I think the patient manages that better for himself.

Dr. Wilson (closing the discussion).—In my paper I did not include compound fractures, but simply alluded to simple fractures of the elbow-joint. In a good many of the cases there is a dislocation accompanying it, but not in all. I did not lay much stress on the carrying function of the arm. I think this will come all right after awhile. If we can see the patient in a few minutes, or a short time after fracture has taken place put the man under an anæsthetic, you can get the arm in good position, and a bandage and dressing will help in a great measure to control the swelling. Sometimes we have to release the dressings a short time, on account of the pain they produce, and redress the parts twice in twenty-four hours. But by using an anterior splint, if it fits properly, in putting the fragments in the best position possible under the influence of an anæsthetic, no matter what position that is, and have the pasteboard mould so as to cover the posterior and sides of the arm, putting it up over the temporary dressing, letting it be fixed, and as soon as the pasteboard becomes dry you have a fixed dressing. The patient should be seen daily, and usually you can judge whether or not the dressing should be released. After three or four or five days you can take off the dressing and examine the joints, and if the inflammation and swelling have subsided you can again anæsthetize the patient, use a roller, as I like best, make a suitable pad of gauze, let it cover the joint, and allow the anterior splint not to go beyond the condyles. First put the elbow in position and the fragments so as to give the least deformity. In other words,

get the best possible position without deformity; then you can fit the splint to the pad, not a plaster-of-Paris bandage, but a trough made of gauze or cheesecloth, heavy, first cut out by the sound arm; fit it to the position. If you have a fracture of the arm, let it go up, if necessary, under the axilla and beyond the insertion of the deltoid and come down and support the hand. After you have got the fragments in position and the swelling has been reduced, and the patient is under an anæsthetic, you can easily find out if the fragments are in position. If you are satisfied you put the dressing on, and the anterior splint should have its right hinge, except I prefer it to come down a little further and go beyond the elbow, as it holds the fragments in place better than any bandage you apply. If, after it is on for a little while, you are compelled to change the angle, release the outside roller, and you have the parts held in position by the anterior splint. When you are satisfied you have proper apposition, leave it there until it is time to take it off, and that is usually about four weeks. After this I take off the permanent splint and thoroughly examine the parts, and if I find it necessary I commence passive motion, use it daily for awhile, in the majority of cases, until I can get the patient so that he can use his arm thoroughly himself. I instruct him to get dumb-bells or to resort to other gymnastic exercises. I do not believe in using violent motion of the elbow-joint under any consideration, for the reason that it is liable to light up an inflammation that will give trouble. If there is considerable anchylosis after awhile, and you are satisfied a fragment is in the way, you can cut down and remove a condyle and epicondyle, or any fragment that is in the way, and your patient will have a good joint. Some of the cases I have seen have gone on for two or three years before they got pretty good use of the joint. I remember one case I saw that had very little deformity of the joint, but some anchylosis. After three years he got good use of the joint, and I do not believe we ought ever to give up in having a fairly developed joint if we treat cases properly in the beginning.

THE USE AND ABUSE OF NORMAL SALT SOLUTION.

By J. Wesley Bovée, M.D.,
Washington, D. C.

Inasmuch as the employment of normal salt solution has become so universal, has proved so valuable, and has been to some extent abused, we have felt constrained to present this paper, hoping by it to induce a free interchange of opinions on the subject.

Definition. The term normal salt solution has been employed interchangeably with artificial serum. It has been applied to various compositions of the constituent elements of the blood and in various strengths, some containing only the salts and others egg-albumin as well. Recently considerable discussion has occurred in medical periodicals relative to the proportion of this chloride in the blood, and some confusion has resulted. According to Kirke's *Handbook of Physiology*, in 1000 parts of blood plasma there are 5.546 parts of sodium chloride—approximately 6 per cent.—and for convenience we will define it as a 6 per cent. solution of sodium chloride in distilled water.

History. In the ancient history of Egypt blood transfusion is attested by divers passages of ancient authors (Ovid, Erophile). At the instance of his mistress, Medée, Jason would have restored youth and virility to the old Eson by bleeding from the jugular vein and injecting an infusion of aromatic plants. In Vienna, in 1656, a solution of opium in sherry wine was put into a dog's veins successfully. Blood transfusion quickly followed this, but, finally, it became a

panacea, and on account of its misuse laws prohibiting its use were promulgated. Again, in 1777, Regnaudot recommended it anew, and later the Baron de Percy, James Blundell, and, more recently, de Belina, practised it successfully. From the impracticability of mediate transfusion of blood the immediate method was employed. But as even this required the convenience of some willing donor of the human family, or the presence of a lower animal it, too, was not suitable to general work. A substitute was found in a synthetical preparation containing some ingredients of the blood-serum, usually of the inórganic salts, with or without albumin. Thomas Latta, inspired by the chemical researches of O'Shaughnessy, injected salt solution into the veins of his patients. Dupuytren, Magendie, and Gaspard followed him in this plan. In 1855 cholera was treated by intravenous infusion of salt solution. The fluid recommended by Little for use in the treatment of this disease was composed of sodium chloride, 50 grains; potassium chloride, 3 grains; sodium sulphate and sodium carbonate, of each 2 grains, and water 1 pint. Alcohol was added to these preparations in some instances. The employment of normal salt solution, its field of usefulness broadening as well, gradually increased up to about 1890. Since then its application has rapidly increased until to-day many surgeons use it almost exclusively for wound irrigations and very largely in other fields, while physicians find its efficacy and the number of its indications constantly increasing. S. C. Gordon, of Portland, Maine, says he remembers Prof. E. R. Peaslee, in 1855 to 1860, was accustomed, in ovariotomy, to wash his hands, to cover his instruments, and to irrigate the abdominal cavity with what he called artificial serum, which was composed of egg-albumin, sodium chloride, and water, in the proportions in which they occur in the blood. In 1879 Bizzozzero and Golgi injected it into the peritoneal cavity, which gave some brilliant results, but, on the whole, became unsatisfactory and was abandoned. In 1888 Dastre and Loye studied its effect on the general physiology of animals and recommended it in infectious diseases.

Comparison of Methods. Its introduction into the body for changing the character and composition of the blood and other purposes has been by five different avenues, viz., intravenous, subcutaneous, intraperitoneal, rectal enema, and intra-arterial. Each of these is said to have its special indications, which will be considered later. The nature of the individual surgeon's work no doubt influences his preference as to route. The abdominal surgeon will prefer the rectal, intraperitoneal, and subcutaneous; emergency surgeons the intravenous and rectal; while the plastic and general surgeon will elect the rectal and subcutaneous routes. The intravenous, while most rapid and, therefore, most applicable to the most dangerous cases, is in itself the most dangerous (except the intra-arterial), as referred to again in this paper. Nor is it always quickest. A private letter from a prominent surgeon in New York tells of his vexation in an important case in which two surgeons were thirty minutes in getting the solution to run into the median basilic vein. And, too, apparatuses specially devised for this method are generally arranged for practising the subcutaneous method until the intravenous can be arranged. We believe the intra-arterial route, recommended by Dawbarn, should never be used.

Physiological Action. We are not aware that the physiological action of normal salt solution has been elaborately studied further than the investigation made by Dastre and Loye, but enough for practical working is known. It increases the volume of the blood and lessens its specific gravity. This, in conjunction with its stimulating effect on the cardiac ganglia and arteries, accelerates the circulation of the blood. By increasing the volume of the blood it increases the arterial tension, and thereby increases the blood-supply to the heart through the coronary arteries. It stimulates the nerve-centres, sometimes causing marked excitement, even when used subcutaneously, as noted by Fourmeaux. The skin, kidney, and intestinal functions are stimulated markedly, and other organs are made to do more work. Locally, it does not coagulate albuminous fluids, such as blood-serum,

but, on the contrary, dilutes them, thus facilitating their removal. It is also a local stimulant, causing contraction of the smaller bloodvessels, and in that way exerting a hæmostatic action. It has a decided stimulating effect on osmosis, and in this way no doubt acts to a considerable extent upon the emunctories. Fourmeaux and other French investigators found the weight of the spleen in the lower animals much increased, though no change in its size was apparent. This effect, though not so constant, was also noticed in the liver.

According to Hayem, Plouvicz, and Poiggale, salt solution augments the number of red blood-corpuscles. Fourmeaux has also demonstrated this. He found in animals, too, the bone-marrow was more fluid after its use, and in one a subarachnoid cerebral œdema after ligating both ureters. This same author, whose thesis on this subject is invaluable, found that in the rabbit quantities of less than four milligrammes to the kilogramme of the animal's weight were retained in the system.

We believe its effect on the blood and glandular system is even more marked than physiologists have told. Otherwise, how explain the fact that blood may be abstracted from a healthy animal up to one-nineteenth its weight and life be restored by the immediate infusion of normal salt solution, while such a result does not follow if the water without the salt be employed.

ELIMINATION. The quantity of urine is remarkably increased, being often four times the usual amount during the first few days following operation and, according to Voit and Rabuteau, the amount of urea excreted is considerably increased. The amount of sodium chloride excreted by the kidneys is enormously increased, and Fourmeaux has noticed on the lips of puerperal septic women that had received large quantities a salty taste and crystals of salt for some days afterward. The reaction of the perspiration becomes neutral and loaded with sodium chloride. In autopsies made shortly after large quantities of normal salt solution had been employed hypodermatically, considerable quantities of thin fluid,

rich in sodium chloride, have been found in the intestine. It has also been noticed that in patients treated by large quantities of the solution, the dosage for catharsis has been markedly lessened. So that it may be said to leave the body by the skin, kidneys, lungs, and intestine, and in the order named as to relative quantity.

THERAPEUTIC USES. As previously mentioned, the application of this solution has been in a wide and varied field. In general medicine its principal use has been in diphtheria, scarlatina, uræmia, intestinal hemorrhage of typhoid fever, perforation of typhoid ulcers, cholera, cholera morbus, pneumonia, diabetic coma, hæmoptysis, ulcerative endocarditis, poisoning by carbon monoxide, by mushrooms, or by alcohol; lead colic, epilepsy, tetanus, toxæmia from colon bacillus, arsenical poisoning, pyelitis, renal insufficiency, and numerous other affections. In obstetrical practice sepsis, post-partal hemorrhage, and eclampsia are the conditions that have been most commonly combated with it. The surgeon has found greater use for it, and probably 90 per cent. of the amount used is by surgeons. They employ it to prevent or reduce shock during operation, and in hemorrhage and sepsis. It is also largely used in shock from injury, for irrigation during operations, and for other purposes to be mentioned later.

When the blood is handicapped by the various poisons of infectious diseases salt solution has been found valuable in the way of "lavage" to carry off the toxins, and by the increased temperature following its use the production of antitoxins is said to be stimulated (T. F. Reilly[1]). In the various chemical poisons, as carbonyl, lead, alcohol, and even mushrooms (Prentiss[2]), it is used in combination with abstraction of blood. In the collapse of cholera and cholera morbus the tissues have been drained of serum, and this condition is ameliorated by the prompt use of the saline infusion. In renal insufficiency the compensatory emunctories are stimulated to greater activity, and it has been noted that as free perspiration occurs

[1] Medical Record, November 12, 1898.
[2] Philadelphia Medical Journal, September 24, 1898.

the renal function is again established. In uræmia in conjunction with abstraction of blood, as recommended some years since by Van Rensselaer, of Washington, the infusion of normal salt solution has proved to be very successful. Grandin has used it in uræmia in enormous quantities by colon irrigations with marked success. As soon as intestinal hemorrhage in typhoid fever is thought to have ceased, the use of the solution by hypodermoclysis is strongly advisable. The danger of hypertension of bloodvessels by the intravenous infusion, and the difficulty in properly estimating the amount of blood loss in such cases, precludes this method from employment in such cases.

In puerperal sepsis it has met with tolerable success, though our experience has been unfavorable. In this condition it has been used in small quantities subcutaneously and frequently repeated, and by the plan recommended by Pozzi, of large intravenous infusions. Hanks and Stimson are strong advocates of this latter procedure. It may be said here that this remedy is not intended to exclude the ordinary means of treatment, but as a powerful adjuvant.

In post-partal hemorrhage is found one of the greatest indications for its use. In puerpeal eclampsia brilliant success has attended its use with blood-letting. J. Whitridge Williams has adopted the practice in this condition of abstracting the better part of a pint of blood and injecting subcutaneously double the amount of normal salt solution, repeating the latter daily until the urine is normal. In some of his cases chloroform and rapid delivery were also practised. He reports ten successful cases. Jewett has successfully employed it alone in eclampsia.

In surgery, shock, hemorrhage, and sepsis are the principal indications for its use. Its greatest influence in shock is exercised if employed early. If shock be from operation infusion should be practised on the table in grave cases, and immediately after operation in milder ones. Here the subcutaneous method is best, but the rectal way is especially valuable, one or two litres being easily thrown into the bowel,

especially in the Trendelenburg position, and if the temperature be from 115° to 120° F. exerts a powerful influence in the reduction of shock. For hemorrhage the same plan of treatment is to be followed. Severe hemorrhage, however, affords about the only indication for intravenous infusion. In our abdominal work we almost invariably leave a considerable quantity (1 to 15 litres) of normal salt solution in the abdominal cavity. When it is not necessary to use it during the operation, this plan is very convenient and satisfactory. It is particularly good to promote urinary excretion and to reduce shock by its intimate and prompt contact with the abdominal viscera. Many other indications for its use are found here. When denuded surfaces are left in the pelvic cavity a small amount of the solution floats the intestine and prevents its coming in contact for adhesion to these places. It dissolves the exudate on such surfaces, and in that way prevents their becoming agglutinated to other structures. If small foci of infectious material, blood-clots or ovarian or other fluids have escaped the eye of the surgeon it dilutes or dissolves them and lifts them up into the general peritoneal cavity for more prompt absorption. It prevents formation of coagula from venous oozing. In large quantities it prevents the collapse incident to the removal of large tumors. Its stimulating action on the large amount of bloodvessels of various sizes in the abdominal cavity is remarkable. It prevents the almost unquenchable thirst so common after abdominal operations. In bleeding fibroids infusion just preceding operation has been practised successfully by Boldt and others. For purposes of irrigation in general surgery it is far superior to sterile water, and is largely used for this purpose.

The amount to be used in the veins and under the skin varies from a few hundred cubic centimetres to a few litres, according to the condition of the patient. In hemorrhage an amount should be used in divided quantities equal to the amount of blood lost, and given in a vein. Or if subcutaneously, twice that amount may be safely employed. Per rec-

tum the amount may be practically unlimited, though at one injection two litres is sufficient.

CONTRAINDICATIONS AND ABUSES. That normal salt solution has great value in surgery we feel our experience with it during the past seven years has fully demonstrated. At the same time, judging from the reports of experimenters, it is not altogether a harmless agent. In personal letters from forty prominent surgeons of this country, in reply to my inquiry concerning the evil and good results of its employment, not one mentioned any unpleasant experience with it, and most of them said they knew of no bad results from its use.

Some writers, however, have sounded warnings against its use in such blood conditions as hæmophilia, dyscrasias, deficient fibrin, etc. It would seem but reasonable that such a strong stimulant, coupled with its dilatation of the bloodvessels when used in large quantities, and especially when thrown directly into them, would be very harmful in such conditions of the circulatory apparatus as myocarditis, pericardial effusion, atheroma, arterio-sclerosis, cardiac degeneration, bad valvular lesions, thromboses, and recent cerebral apoplexies. Chronic inflammatory conditions of the kidneys—sclerotic and tubercular—are apt to be aggravated by it. Chronic affections of the liver and of the lungs are made worse, especially if malignant in nature. Great discretion is needed in its employment in many conditions. To throw into the circulation, either directly or indirectly, a considerable quantity of salt solution during active hemorrhage from large vessels would be not unlike enlarging the wound in the vessel. It would be forcing the blood out from behind. Were preparations being made for laparotomy for ruptured tubal pregnancy during active hemorrhage, salt solution could with safety be used hypodermatically, provided enough blood was yet in circulation to absorb it. And this would be a wise procedure, as the vessels would be soon ligated, and augmentation of the volume of the blood would immediately begin, provided the injection were well timed. If the intravenous

route were selected its employment could not be before the vessels were ligated. To use this remedy during consolidation stages of pneumonia is to overtax the circulation. In hæmoptysis to employ it during active hemorrhage would be, also, to encourage increased blood loss, while to inject it frequently and in small quantities under the skin as soon as active hemorrhage has ceased is to rapidly improve the patient's condition. The same holds good in all active hemorrhages. Wiercinsky[1] demonstrated that in acute anæmia from hemorrhage it is preferable to inject 100 to 300 c.c. many times than large quantities at once. Its use should be continued until normal arterial tension has been reached. The presence of toxins in the system has been found to retard the elimination of normal salt solution, and for that reason small quantities only should be given at a time and as often repeated as needed.

To inject salt solution late in colon bacillus infection is to embarrass the circulation, while its early use is attended with marked success (Bosc and Vedell).

Precautions. It is necessary to avoid certain accidents and mistakes in employing normal salt solution. We must know the solution is sterile when it passes into the patient by any route other than the rectal. By the latter we cannot expect to be absolutely aseptic, nor is it necessary. This aseptic procedure requires aseptic solution to be placed in a sterile vessel, in which it is kept in the same condition. The tube and needle or canula through which it passes to the patient must be sterile. The skin through which a needle is to be plugged, or an incision made for intravascular infusion, must be rendered aseptic or as nearly so as possible, according to the haste necessitated by the indications for its use. We should avoid the passage of air into the tissues or vessels, though some experimenters have said small bubbles do no harm. The temperature of the solution when it reaches the tissues should be 105° to 120° F. This is important, as the

[1] Centralblatt f. Gynäkologie, 1889, No. 41.

stimulating properties of the high temperature are needed, particularly in shock, renal insufficiency, uræmia, eclampsia, and sepsis, as the skin must act strongly as an emunctory. Chills following shortly injections of salt solution are harmful, notwithstanding their easy correction by morphine hypodermatically (Hanks). They are not welcome in patients of such low vitality as to require the use of the salt solution. We have seen hot salt solution in the reservoir, and yet owing to some obstruction in the needle or flow tube it was cold when it reached the tissues. Considerable allowance must be made for fall in temperature of the solution in passing through the tube. This may be overcome by placing the tube in a dish of hot water near its lower end. A better estimate of the rapidity of the current through the tube is to be had when a transparent glass tube having the same calibre as the rubber tube is inserted a safe distance into the divided ends of a section of the latter. Probably never more than half a litre should be infused in one place in the cellular tissue, as local necrosis and aseptic inflammation, as results of overdistention of the tissue spaces, have been noted by Noble and others. Probably this would not occur were not more than 500 c.c. introduced through any one puncture. The rapidity of the inflow of the solution is another important matter. Broun, of New York, has noticed pneumonia follow too rapid intravenous injection of saline solution. Fourneaux noted engorgement of the spleen and liver, with marked pain in the former, and pleural, peritoneal, and subarachnoid effusions have been reported. Of course, much hemorrhage preceding it would lessen these dangers, as they are probably due to overdistention of the circulatory apparatus. It is probable, as a rule, that one ounce per minute is a maximum quantity that can be safely introduced into veins or subcutaneous tissue. Many alarming symptoms and conditions have been observed to follow the use of normal salt solution, among them being pulmonary œdema, dyspnœa, according to the degree of œdema, headache, vertigo, specks floating before the eyes, somnolence (probably from ventricular œdema or

cerebral hyperæmia), mental excitement, delirium, hallucinations, severe pain in the left side, and throbbing in the neck. The changes in the spleen and liver found at autopsies have already been mentioned. These must be prevented when possible and combated when present. The tension of the arteries is the criterion as to the amount of the solution to be employed, though this does not hold good in sepsis. In shock and hemorrhage the radial pulse is usually a good guide. If these points are considered in using salt solution it is believed less trouble will arise from it.

DISCUSSION.

Dr. Joseph Taber Johnson, of Washington, D. C.—Mr. President: Dr. Bovée's paper was a revelation to me in many respects. I have been interested in the normal salt solution for some time, but I had no idea that it had such a wide range of usefulness. I do not know much about its abuse. Undoubtedly it has been improperly used in some cases with unsterilized instruments, or without properly sterilizing the location where the salt solution was introduced. In this way local abscesses have been sometimes produced by its improper administration. It has been my custom in cases of abdominal surgery, where there has been quite an area of raw or absorbing surface left after the enucleation of a fibroid, an intraligamentous cyst, or a large ovarian tumor, to leave in the abdominal cavity anywhere from a quart to a gallon of the salt solution, which I find has an excellent effect in floating the intestines, thus keeping them away from the raw surface and at the same time diluting any fluids which may be left in the abdominal cavity. This practically performs the office of transfusion. The salt solution lessens very materially the disagreeable and almost unquenchable thirst from which patients suffer for a longer or shorter period after an abdominal section. For these purposes I have used the salt solution with a great deal of satisfaction.

In one instance, a short time ago—following the suggestion of a recent writer, in a case of puerperal eclampsia, where the patient was suffering from uræmic poisoning, which is generally

the cause of that condition—for the first time in my life I abstracted a considerable quantity of blood, which was supposed to be loaded with poison, and then injected by hypodermoclysis an equal quantity of normal salt solution. The convulsions continued for a time, and we bled the patient again and injected more of the salt solution, the argument being that in bleeding the patient we got rid of a certain amount of poison, while at the same time we diluted the rest by introducing the normal salt solution into the circulation. She recovered.

I used it on another occasion where there was considerable hemorrhage after the removal of the clamps in a case of vaginal hysterectomy for cancer. We thought the patient was going to die. It did not seem possible to reach up and seize the bleeding points, or find them even with clamps from below, in the dark and surrounded by so many very important structures, especially the ureters, intestines, etc., and we did not know exactly what to do. We resorted to immediate transfusion. For some reason, I do not know what, the hemorrhage stopped from below, and in half an hour the woman was talking about her condition. On two or three occasions I have seen the normal salt solution do wonders —by opening a vein and carrying out the technique of its administration thoroughly. It seems to me it is of incalculable assistance to us in operations where patients are likely to need transfusion on account of sudden or unexpected hemorrhage. It should be used in hospitals and in clinics particularly, and young graduates and internes should be instructed in the technique of the operation. It does not look difficult to administer the normal salt solution, but I have seen it given with absolute failure, in that the physician would thrust the point of the apparatus into the tissues instead of into the vein. In one case in which it was injected into the vein the patient came near dying in consequence of the admission of air, and it seems to me the method of its administration should receive more attention than it has thus far. Normal salt solution is certainly a valuable adjuvant in our operations, and it is going to be used a great deal in the future.

Dr. George H. Noble, of Atlanta, Ga.—I am satisfied that normal salt solution has not only a place in surgery, but in general practice. While I am not doing general practice, yet I have seen many instances in which the use of normal salt solution has unquestionably saved life. Its greatest use is called for in rapid

and copious hemorrhage, and intravenous injection is unquestionably the method to be used. Unfortunately, the vessels are often collapsed, and it is difficult to introduce the nozzle of the instrument into the median vein because it may be reduced to the size of a small straw. When hemorrhage has not been rapid or copious the solution can be used subcutaneously with good effect, but it is slow in its action. The subcutaneous injection is best used as a preventive measure. By intravenous injection we get the desired results at once. I recall a patient who was dying from septic infection, and it was only intravenous injections of normal salt solution that restored consciousness and saved her life. Quite recently, in a case of acute gastritis, in which there was evident exhaustion, the patient's life was saved by the subcutaneous injection of two or three pints every four hours. I should say that three or four quarts in twenty-four hours filled the circulation and the coronary arteries, and in this way resulted in stimulation of the heart. In cases of persistent nausea and vomiting of pregnancy, where the patients have gone so far that it becomes hazardous to evacuate the uterus, material benefit and relief from this procedure may be obtained. Occasionally, after the uterus has been evacuated, the nausea will continue for a few days, and unless there is some relief the patient will die. I have seen patients pull through such an attack after the administration of salt solution.

Dr. F. W. Parham, of New Orleans, La.—I regret very much that I was unable to hear Dr. Bovée's paper. I desire to call attention to two or three points that have impressed me very much during a considerable experience with the use of the normal salt solution. In the first place, I refer to the temperature of the solution, believing that a great deal depends upon it. I have recently adopted, with great satisfaction, a suggestion made by Dawbarn to use the solution very hot. I have used it so hot that it was extremely uncomfortable to the back of my hand. I began using it at a temperature of 120° F. for the first half-pint or pint, then allowing the temperature to drop to 115° F., then infusing a number of pints of the solution at a temperature of 108° or 109° F., not going below this. I have found that in those cases in which I have used the salt solution at the temperature mentioned there has not been any chill. Another point I lay stress upon is repeated infusion. I recently had a

case to operate upon in which I very much feared I would be unable to complete the operation, and so I had to administer about five pints of the solution at the time of operation, leaving the canula in the vein; and the next morning, finding a very much depressed pulse, running up to 160, and, feeling that the patient would die in the course of a few hours, I infused again four pints, making a gallon or more. The patient quickly improved after the second infusion, and ultimately recovered. These two points are important. I have no doubt Dr. Bovée has gone exhaustively into the subject, and I regret not having been able to hear his paper.

Dr. A. M. Cartledge, of Louisville, Ky.—The subject has been so thoroughly discussed that I shall have very little to say. We all appreciate this great advance since the introduction of the principles of antisepsis and asepsis by Lister. We all admit the value of normal salt solution and its universal application. Several years ago I had occasion to remark in this Association that unquestionably our patients were dying from loss of blood, and the deaths were attributable to shock. At that time the subject of shock was under discussion. I believe that is the case at the present time. A great many surgeons are not fully impressed with the advantages of the normal salt solution and its more universal application. I would like to insist upon the fact that I do not think a surgeon is justified in doing any operation, whether in general or special surgery, without being prepared beforehand to administer salt solution, if necessary. I want to say, further, that I am still firmly convinced that people throughout the centuries have died from loss of blood, and not shock, in the strict sense of the term, and that when a man or woman has bled to death I believe death was attributed to shock.

I wish to call attention to one or two phases of this practice, and that is the value of normal salt solution as a diagnostic measure. In abdominal surgery we frequently have a pulse that is out of all proportion to the amount of blood that is lost, particularly in so-called neurotic women. The pulse is very rapid. I want to say that eight or ten ounces of normal salt solution placed under the breast will clear up the diagnosis instantly. A nervous pulse is not influenced by it, as a rule, but a pulse which is the result of the loss of blood will immediately come up. I would impress upon surgeons in general

the great importance of always being prepared to use normal salt solution, and by so doing I believe there will be as many lives saved from it as from asepsis, and that is saying a good deal.

Dr. Louis McLane Tiffany, of Baltimore, Md.—What Dr. Cartledge has said is eminently true. I have a transfusion apparatus which is hung in the operating-room, and the normal salt solution can be used whenever we think it is necessary; but it is more especially in septic cases that I wish to speak of its use. Where a patient is dying of profound sepsis, with a pulse of 160, the eyes sunken, the cheeks white, and lips dark, the pulse falls from 160 to 120 after the injection of a couple of litres of normal salt solution, or less than that, even; in two or three hours the pulse comes up again, and when the eyes become sunken, and the cheeks get pale, then some more salt solution is needed. The advantage of bleeding from the arm and putting salt solution in the veins is probably of value. Of course, it has yet to be proved by a sufficient number of cases, but the drawing of blood from the arm, to be at once followed by the putting of salt solution in the vein, is as good a treatment for profound sepsis as one can undertake. Unquestionably it produces at the time very extraordinary results, and whether the improvement will continue remains to be proved by reports of many cases. At present I am of the belief that the withdrawing of blood by venesection and the injection of normal salt solution is proper treatment for profound sepsis.

Where a septic patient has for a considerable time been moribund he is not going to be saved by any medication that I know of. I can produce no reaction in such a patient by the administration of any medicine or by adopting any therapeutic measure except the injection of salt solution, and by it I can arouse a patient. Where there is time, give it under the skin. Shortly after injecting the salt solution in such cases the patient brightens up and knows what is going on about him; there is a great change. I speak particularly of the use of salt solution in those cases that have fallen under my observation and care as the sequel of an appendicitis rupture, not walled off, but communicating with the general peritoneal cavity; when cloudy, fecal-smelling serum fills the peritoneal cavity, and those cases are often rapidly fatal; there has never been a lump in the right

iliac fossa. The surgeon opens the belly, and everything is floating in cloudy, fecal-smelling serum. In those cases (and I here believe I am not in accord with the treatment of the present day) I do not irrigate the peritoneal cavity. I have not done it for probably two or three years. I have the abdominal walls raised by retractors, for under anæsthesia they become relaxed, and I wipe out with clean gauze the peritoneal cavity methodically. Whether up under the liver, in the neighborhood of the spleen, or down in the pelvis, I scrub my patient's peritoneal cavity—I will put it that way. I do not find it necessary to eviscerate, and I do not irrigate. Having dried the peritoneal cavity as well as I can, I fill it systematically with gauze strips as long as necessary, the ends of the strips protruding through the abdominal incision. In one case there were seventy-two strips in my patient's belly. If such a patient does not die in five or six hours, not only will those strips of gauze be wet with ill-smelling serum, but the bed will be wet. In other words, the patient drains the serum from his peritoneal cavity. He washes himself out, or the woman does, as the case may be. The peritoneal membrane is no longer an absorbing membrane; it is a pouring-out membrane. It irrigates itself. Use, then, salt solution, and what you put into a man's veins comes out through his peritoneum and through the gauze, and cleans his peritoneal cavity.

Dr. Howard A. Kelly, of Baltimore, Md.—I also think that among the adjuvants of use in gynecological operations and during convalescence normal salt solution must be given an important position. It has a very valuable place in our operative work, and it is useful in a number of diverse conditions. I invariably, after an abdominal operation of whatever nature, simple or complicated, give as an enema a quart of saline solution, the buttocks of the patient being elevated to an angle of thirty-five degrees, to facilitate its retention. If the patient is in a condition of shock I give with it some stimulant, such as carbonate of ammonium or brandy. We have noticed since we began this procedure a remarkable disappearance of the distressing thirst following operation. This is shown in an interesting manner by a chart I have had constructed, in which a number of cases are taken and a composite picture drawn from them. From this chart it is seen that the depression in amount of

urinary secretion, seen for many days after operation where no salt solution or enema has been given, is almost entirely absent in those cases in which it has been used.

I use the salt solution in cleansing the abdominal cavity of any septic material that may have escaped in washing out the pelvis. For instance, if there has been a ruptured abscess and a microscopical examination of the pus shows that there are micro-organisms in it, I use the salt solution. In those cases where an abscess has ruptured and some of its contents has escaped into the peritoneal cavity, and there is reason to believe that the pus is virulent, where there is some slight contamination of the peritoneum, but no evidence of peritonitis at the time of operation, I try to dilute the septic material as much as possible by the saline solution, in order that it may be taken up by the lymphatics. Its use is valuable in such cases.

I am very emphatic in the belief that it is a serious mistake to use the solution in a case of active peritonitis where the absorbing power of the peritoneum is impaired. I remember three years ago putting a pint of the saline solution into the peritoneal cavity in a case of this kind, and death ensued. The saline solution in the presence of active peritonitis is not taken up. It also ought not to be used in the peritoneal cavity where a gauze drain has been inserted, owing to the fact that the gauze plug may dam the saline solution back, and there is always more or less interference with the absorptive power of the peritoneum in these cases.

In cases of hemorrhage I give sterile normal salt solution under the breast in women, administering a pint or two pints, according to the needs of the case. About five years ago I injected saline solution into the arteries of a young woman who had puerperal hemorrhage, with the very definite result of saving her life. I have used it in a number of cases in clinics, and in cases of extreme hemorrhage from extra-uterine pregnancy, where the patient showed signs of collapse and we were afraid she would die on the table. In one case in which I gave intra-arterial infusions in the brachial artery against the current, a dry gangrene of the hand ensued, necessitating amputation at the wrist-joint. I have never used intra-arterial injections since that time; and intravenous injections I have also given up, because I find the saline solution is absorbed so rapidly from under the breast that it leaves

nothing to be desired. I would give it in the following manner: The needle should be about four inches long, and as large as a fine knitting-needle, bevelled off and sharpened at the point, with a little head on it to enable one to slip over it the end of a piece of tubing which has a funnel at its other end. This is really all that is absolutely necessary. You take a little bistoury, puncture the skin, and thrust the needle under the breast; you inject the salt solution slowly, taking about ten or fifteen minutes to do it, in which case it is absorbed as rapidly as you inject it. Before the patient leaves the room the breast is tense and firm, and feels like a phlegmon; later the swelling goes down and the breast becomes soft. There is an advantage in administering the saline solution slowly, in that you can give more under one breast; if necessary, two men can be put to work, giving it under both breasts.

With reference to the remarks made by Dr. Tiffany in regard to sepsis, the normal salt solution can be given with great benefit at intervals of from four to six or eight hours, giving a pint in the cellular tissue.

With reference to his remarks on irrigation, I irrigate in cases of appendicitis with perforation, and I have just had an instrument made which I think is quite satisfactory. I do not like evisceration any more than Dr. Tiffany does, and I would not attempt it unless it were in sthenic cases caught at the first. Take a patient with a pulse very much accelerated from general peritonitis, and she is going to die if we take out the intestines and expose them long. In those cases I use a glass tube about the size I see here, and carry it to all parts of the abdominal cavity through my lateral incision. In a case I had last week fully a pint of pus was removed by irrigation from the original focus down in the pelvis. When the irrigating nozzle was carried under the liver the fluid began at once to become milky, showing that there was an accumulation of pus there also. After thoroughly irrigating the peritoneal cavity until the fluid came away clear, I cut down in both flanks, put an extremely large gauze drain in either flank, and in the median line down into the pelvis. This was done in a male patient. In the case of a woman the pelvic drain is to be brought down into the vagina.

Dr. Lewis S. McMurtry, of Louisville, Ky.—The use of normal salt solution is becoming so universal that it is not limited

to surgery, but it is also used by physicians in the treatment of hemorrhages of various character that occur in the course of acute or chronic diseases, so that in a discussion like this certain incidental points connected with the use of this method should receive attention. I desire for a moment to direct the attention of the Association, first, to the importance of thorough sterilization of the solution before its use and of everything that is employed in connection with it. In a discussion on this subject in a local medical society one of our surgeons was opposed to the use of normal salt solution on account of numerous phlegmons that had been made in administering it underneath the breast. This is due to imperfect cleansing of the skin or to imperfect sterilization of the needle used in injecting the solution. If the normal salt solution is prepared in large quantity, kept in the operating-room, and a certain proportion of the saturated solution added to a certain amount of water, it can be used in cases of emergency, or in cases of great danger from sepsis, as has been suggested by one of the previous speakers, with great advantage and effect. The solution should always be made in advance of the operation, and all of the apparatus used in connection with it ought to be rendered sterile beforehand, and when the solution is used it ought not to be used hastily by some one unfamiliar with it. There should be some one beside the operator to administer it carefully. The solution ought to be made fresh for every operation, and the apparatus for injecting it should be previously carefully prepared.

I want to call attention to one difficulty which experience will show, and that is in cases of extreme hemorrhage there is considerable difficulty experienced in finding the superficial veins to introduce the canula in order to effect direct venous transfusion. If you try this, for the first time, in a patient who has been very profoundly exsanguinated by quick hemorrhage, you will find that when you search for the superficial veins at the flexure of the forearm upon the arm, you will be unable to find them, and it will be necessary to seek some larger vein. In emergency cases the patient's life is in great jeopardy, and the surgeon should be prepared to make intravenous transfusion.

In cases of extra-uterine pregnancy exhausted by hemorrhage it is an excellent plan to use normal salt solution before the

operation is begun by injecting a quantity of it where it would be thoroughly absorbed.

Dr. Tiffany has introduced a very interesting subject in connection with the topic under discussion, and that is in regard to the subject so closely allied to this of cleansing the peritoneal cavity, and it has been touched upon by Dr. Kelly in his remarks. I think there is a tendency to be too much afraid of irrigation. Whenever we find that we have gone to an extreme in any one detail of practice, immediately the tendency is to commit an error by running the risk of going to another extrême that may be erroneous. It has been my practice to use drainage and irrigation thoroughly in operations in the abdominal cavity, and to use normal salt solution for cleansing purposes. For example, in the case of large ovarian cysts full of gelatinous material, if rupture occurs and the peritoneum is soiled by the contents of the cysts, we find that the salt solution will wash out this gelatinous material far more readily than water will, and its range of application there is very valuable. I have not seen any harm come from washing the peritoneal cavity with it. When one's operative skill increases, and particularly his manipulative skill, so that he knows how to enucleate pus tubes without rupturing them, so that he knows how to loosen visceral attachments to suppurative cysts without letting the pus run all over the peritoneum, he will have far less need of irrigation than in his early experience. Consequently, I do not drain as much as I did in my previous operative work; but I am not at all prepared to say that irrigation of the peritoneal cavity, carefully done, does any harm.

There is another subject that has been introduced, and to which I should like to direct attention, and that is in regard to gauze drainage. We need more radically to change our practice in regard to gauze drainage than any other feature of abdominal or pelvic surgery. Drainage by gauze is exceedingly imperfect. It drains serum only for a limited time, and as a method of drainage it is not comparable with tubular drainage.

Dr. George A. Baxter, of Chattanooga, Tenn.—The use of intravenous injections of normal salt solution cannot be too highly commended in abdominal or gynecological cases. But there is a large field for its use in surgery independent of those,

particularly in emergency surgery, where there is great loss of blood, and this method may become impossible, so that the surgeon is driven to other methods of restoring the fulness of the circulation and keeping up the heart's action until an operation can be done for the purpose of restoring the patient. In such cases unquestionably the rectum affords the best opportunity for the use of the salt solution, and it has been my observation that the rectum in cases of extreme exsanguination in surgical cases will take up water as rapidly as a sponge. I recall to mind a case that I believed was dying on the table from amputation near the hip-joint, the patient being restored so that the operation could be completed immediately afterward within a few minutes by the rectal injection of hot water. This case was one of severe hemorrhage, and the patient was greatly exsanguinated from prolonged disease preceding the time of operation. While I commend in every respect the two methods of intravenous and cellular injections as preferable, perhaps, to the rectum, I would lay stress upon the preparation of enemas of hot water for the purpose of restoring the circulation in those cases of extreme exsanguination in emergency surgery. There is no question but that in such cases absorption is much more rapid than it would be under ordinary conditions, and it is my practice where much blood has been lost to carry two syringes in my ordinary emergency bag, and if the pulse indicates extreme exsanguination and operative procedure has to be deferred, I inject the rectum with hot water, having in view two objects: restoration from shock and the filling of the arteries.

Dr. F. W. McRae, of Atlanta, Ga.—I desire to refer to one point in connection with this subject that has not been mentioned, and that is the use of the normal salt solution in hemorrhages that have not been stopped; where the bloodvessels cannot be gotten at, the intravenous injection of normal salt solution is dangerous. Several years ago I had a young man who was bleeding to death from a typhoid ulcer. He was transfused with normal salt solution, but died suddenly during the transfusion, very much sooner than he would have done without the operation, I am sure. When the vessels are bleeding and cannot be gotten at and stopped, the intravenous injection or transfusion of salt solution is a source of danger, because it still further dilutes the

blood and causes greater loss of blood than would otherwise occur.

Dr. George S. Brown, of Birmingham, Ala.—I have used normal salt solution in a variety of cases not mentioned thus far in the discussion, and in the last three years I have used it probably three hundred times in fifty cases, most of them being surgical cases. I have never seen a single inflammatory condition in the three hundred punctures. I have imitated the plan of Dr. Kelly in keeping it in the operating-room in a sterilized condition and sterilizing it immediately again before using it, because it has to be hot. The puncture made by the needle is a big item to the patient. I have put as much as two quarts in one puncture, allowing a part of it to become absorbed, then putting in more. The amount which one can put in one place seems to be almost limitless and harmless. I have seen two cases of pneumonia at the crisis and two cases of cholera infantum in the practice of my associate, pulseless at the wrist, all of which reacted promptly to normal salt solution, and it leaves no doubt in my mind as to its wonderful stimulating effect.

I think its greatest use, as Dr. Tiffany has said, is in septic cases, hemorrhagic conditions, etc. I have seen one acute hemorrhage in which we used it. This was a case of hemorrhage from the removal of a stone from the kidney. I have used it in septic cases several times, and many of the patients were maintained for a week or two at a time. One of them was a case of gunshot wound of the lung in a fat man. The bullet could not be found. An abscess had formed, which could not be located, and I merely made an opening in the pleural cavity with the hope that it would finally drain, which it did at the end of a week, and the man recovered. This man would take two or three gallons of the normal salt solution a day, and would sweat profusely afterward. I have been a little disappointed in regard to its use in railroad injuries, in that it does not seem to combat shock like it does hemorrhage and sepsis. I have had a number of cases of crushed legs in which there was considerable shock, and the normal salt solution in those cases seemed to have no effect.

The only abuse of it that I can imagine has been pointed out by Dr. McRae, namely, using it while hemorhagre is going on.

My associate recently had two cases of hemorrhage from typhoid fever in which he wisely refrained from using it, and I believe the essayist mentions that in cases of hemorrhage from ectopic pregnancy it would be unwise to use it.

Dr. Bovée (closing the discussion).—I read the paper to bring out a discussion, and I am very glad to see that we have had a free discussion on the subject. I have no additional facts to add to what I have already said.

THE CONSERVATIVE TREATMENT OF THE DISEASED OVARY.

By Joseph Taber Johnson, M.D.,
Washington, D. C.

The difference between the radical and conservative treatment of the diseased ovary is somewhat difficult to define, inasmuch as the most radical treatment under some circumstances is really the most conservative; while in other cases, to conserve the best interests of some particular diseased ovary requires the most radical surgery. In other words, then, circumstances may present where the most conservative treatment would be the most radical, and *vice versa*.

In the early part of the present decade quite a conservative wavelet swept over the country, and considerable harm was done to pelvic and abdominal surgery in the mild and gentle name of conservatism. Incomplete conservative operations were done, some of which had to be completed later on by radical operations.

Some of the men who claimed to be the most conservative, and attracted the timid doctors and frightened patients, were actually removing more ovaries and tubes than many of their so-called radical friends. Much credit has been claimed for saving a part or the whole of one ovary and tube when only a simple catarrhal salpingitis existed, by an operator posing before the profession and community as a conservative, when the surgeon designated a dangerous radical, to be avoided, would actually not have operated at all, and would probably have cured his patients by other means.

In some instances real, genuine, successful and beneficial conservatism was practised with lasting beneficial results, but not always from the highest and purest motives.

And, again, it is feared that actual radicalism has successfully masqueraded in the name and guise of conservatism, to the injury of the trusting patient and the discredit of good surgery; but let us hope these instances have been few and far between.

With the wonderful improvements in abdominal surgery within this generation more and more has been learned in regard to the toleration of the peritoneum.

Former fears of opening and manipulating within its cavity have well nigh disappeared, so that now the chief objection in the minds of many to an abdominal section has come to be, not so much from what is done within the abdominal cavity, but as to how it is to be closed when the operation is finished, so as to prevent the occurrence of ventral hernia. Thomas Addis Emmet said, two decades ago, that the danger in abdominal surgery was not so much from what was taken out of the peritoneal cavity as from that which was introduced into it during an operation.

But nowadays, instead of spending valuable time in sponging out every drop of blood, or other fluids, or putting in a drainage-tube, we frequently flood the cavity with quarts of normal salt solution, thus diluting and spreading the residual fluids over a greater area of absorbing surface, warming up the somewhat cooled abdominal viscera, floating the intestines away from any overlooked raw surfaces, while at the same time we are performing an actual transfusion.

So much has been learned by accumulating experiences as the domain of the gynecologist has undergone so much "expansion," to borrow a term which has acquired a new significance in the recent history of our country, that real conservatism is gradually gaining ground over real radicalism to such an extent that he who presents ovaries and tubes or a fibroid uterus in a modern, up-to-date medical society, has to state very good reasons why he sacrificed these important organs in their entirety, to escape criticism and, possibly, censure.

Craniotomy has been almost entirely displaced by the more

scientific, humane, and conservative, improved Cæsarean section. This was not the case as long as it could be said that a successful Cæsarean section had not been performed in the great lying-in hospital in Vienna for a period of one hundred years. When the accumulated evidence proved the conservative operation showed better and more humane results, the more radical and sacrificial operation was relegated to the back seat of necessity, while the Cæsarean section became the operation of election.

Not fifty years ago the mortality attending the removal of fibroid tumors of the uterus was so great that few operators attempted its performance. At the present time, however, it is most gratifying to be able to state that in the gradual evolution of supravaginal and panhysterectomy the former frightful mortality has been reduced in good hands, and in a surgically clean environment, to the same, or even better, average results than its sister operation of ovariotomy.

And yet the more conservative surgical procedure known as myomectomy we are now declaring is the ideal operation of the future. By one method the uterus and ovaries are sacrificed; the woman goes through life "a mutilated and blighted being," thinking that she has paid a great price for her life and freedom from the pains and hemorrhages produced by her tumor.

By the more conservative method she is also freed from the burdens of her tumor, but at the same time she rejoices in the possession of her essential female organs. She has not actually undergone any mutilation, nothing has been removed which makes her different from other women. The tumor is gone, and that is all, unless some other part was so diseased as to require removal also. Since Battey suggested normal ovariotomy for the relief of many of the uncontrollable nervous and painful symptoms accompanying the menstrual molimen, in 1872, and Lawson Tait in the same year, the removal of the uterine appendages for chronic inflammatory and suppurative diseases of those organs, and Hegar, in Germany, about the same time, recommended the complete re-

moval of the ovaries and tubes for arresting the growth and hemorrhages of fibroid tumors of the uterus, many of these important and special organs of sex in the female have been sacrificed, which accumulating experience and the improvements in abdominal surgery now make it possible to save. For a score of years Battey, Hegar, and Tait set the pace in three of the greatest countries of the globe. Radical operations were the rule. So great was the fear of opening the abdomen that when it had been once opened for the removal of an ovarian tumor and the appendages on one side, the other ovary was too often removed, also, if it showed any signs of being even slightly diseased; and in not a few instances the only reason given for its sacrifice was that it might some day become diseased, and had, therefore, better come out while the opportunity offered, without increasing materially the danger or expense of the patient.

In this field I am proud and happy to say that sacrificial surgery is gradually giving way to more scientific, conservative and humane methods. I believe there is a maxim in general surgery in favor of saving every inch of the human body possible, and another, that it requires a higher order of skill to save a mutilated or diseased member than it does to cut it off or to cut it out.

With my present experience in abdominal surgery I am free to confess that I can and do now save ovaries and tubes which I formerly thought it necessary to totally remove. The increasing skill of our abdominal surgeons and their accumulated experiences in actual conservative work go to show that we are approaching nearer to that true conservatism which is the offspring of increased skill and experience, and is not that kind of clap-trap conservatism which has been paraded as a by-play to the galleries and publicly used as a means of attracting practice and increasing profits.

It is just as true in abdominal surgery, if not more true, that it requires a higher order of skill and a greater experience to save an organ, or part of an organ, than it does to

remove it. This statement is illustrated in a recent experience of my own.

In operating for the relief of a retroverted and bound-down uterus, accompanied by a prolapsed and adherent ovary, it was found, after separating all the adhesions, that a cyst about the size of a marble had been ruptured in the adherent ovary; when it was brought into view it was found to be lacerated, and oozing from this cyst cavity came a sanguinolent fluid. Formerly I would have removed that ovary, but with an accumulated experience with the toleration of the peritoneum to clean manipulation and careful instrumentation, I drew the bleeding organ up into the abdominal opening, surrounded it with gauze, scraped and cleaned out the cyst cavity, which occupied fully one-third of the ovary, and carefully stitched its edges together with fine silk. The uterus was then suspended by two silk sutures to the peritoneal surface of the abdominal wall, and the abdomen closed. I had no fear this time of the result. The first time I did such an operation I did fear a very great deal, but I felt a confidence in this case which was born of accumulated experience. I felt sure she would get well, and she did, without a rise in her pulse or temperature above 100° after the first day. From being a terrible sufferer during her monthly periods, she had no pain in the first menstruation after her operation. Is not this better than to have removed this ovary in a marriageable young woman, only twenty-two years of age? To save it required more time, more fine work, and more technical skill, but saving is better than sacrificing when the conditions are favorable. Especially is it important to save a portion of one tube and of one ovary when the other has been removed on account of a tumor or an abscess, or for any other cause.

The disagreeable symptoms accompanying the artificial and premature change of life are often stormy and protracted, in some rare instances threatening, if not resulting in, actual insanity. They are happily prevented by saving one or a portion of one ovary. Menstruation is generally not inter-

rupted, and the sexual and other feelings of the patient undergo none of those sudden and peculiar revulsions which, unfortunately, sometimes follow the total removal of both ovaries and tubes.

Goodell, of Philadelphia, and Polk, of New York, were among the pioneers in this work, but at the time of their first emphatic utterances the profession was not quite ready to accept their teachings or to believe in their practice. Some of their overzealous, too enthusiastic, and less skilful followers did actual harm by incomplete and badly executed operations, requiring the most radical kind of sacrificial surgery occasionally to save lives improperly jeopardized through a mistaken conception of conservatism. Dr. A. Palmer Dudley, of New York, reported a brilliant series of 103 conservative operations upon the uterine appendages, without a death, at the last meeting of the American Gynecological Society. His paper was very favorably discussed by Drs. Kelly, Gill Wylie, Mann and others who had done similar and other conservative work within the peritoneal cavity. Dr. Dudley did not hesitate to cut away the diseased portion of the tube and stitch its healthy end to the healthy ovary, with good results following in nearly all of his cases.

In other cases the remaining portion of the tube was irrigated with an antiseptic fluid and stitched to the ovary.

And still other cases where one ovary and tube have been removed on account of the presence of a tumor or an abscess, and the other ovary and tube have been found somewhat involved, the diseased portions have been resected and the healthy portions stitched together with perfect recovery. Pregnancy subsequently occurred in several such cases. As a result of the increasing conservative treatment of the diseased ovary, we may save many of our patients from the premature occurrence of the menopause, with all that that implies.

Many patients would consent to operative procedures rendered advisable by their unfortunate conditions if they could be assured that they would not be "unsexed," as they call it.

While menstruation is looked upon by most women as a

curse, or a great inconvenience, at least, very few welcome its disappearance with any degree of pleasure. It is believed to be the beginning of old age, which is so much dreaded, and while they may not desire more children, the feeling that they have been made so different from other women by the complete removal of both ovaries and tubes carries with it an indescribable, and often undefinable, feeling of abhorrence.

Of course, what they all want is restored health, and if the sacrifice of their organs of sex is necessary to the accomplishment of this much-desired object, they will, in a large majority of cases, consent to follow the advice of their trusted medical and surgical advisers.

If our growing experience in the abdominal cavity and the accumulation of evidence continues to grow in favor of more conservative and less sacrificial operative work, I feel sure that the deep debts of gratitude now felt toward abdominal surgeons by suffering women will be tenfold increased and intensified.

In cases where both appendages have been removed, Dr. Sherwood-Dunn, in an interesting paper, has shown that many of the disagreeable symptoms accompanying the enforced change of life may be greatly mitigated, if not altogether prevented, by the use of the ovarine extract. I have had no experience with this remedy, but there seems good reason to hope that considerable good may be accomplished by its more general use, if a good article can surely be obtained.

In still another class of cases conservative work upon the diseased ovary has resulted in life-saving operations at the time, and, in many more instances than expected, symptomatic, practical and permanent cures have been effected.

I refer to those tubo-ovarian abscesses where, from the low condition of the patient, and the low position of the abscess, and from her history and general appearance, it is apparent that a prolonged and difficult operation confronts the surgeon, if done through the abdomen. If he insists, in accordance with his own or anyone's ironclad rules, upon entering the abdomen from above in all cases, separating firm and numer-

ous adhesions to intestines and other viscera until he reaches the pus-cavity, and goes through with the usual technique so sadly familiar to us all, the average operator runs many more chances, in my opinion, of operating his patient to death than if he had made a simple conservative vaginal puncture, removed nothing but the offending and life-destroying pus, irrigated and drained the pus-sac and put her back in bed in ten minutes, without shock, with no hemorrhage, no stitches, no ligatures, no dressings, and no bandages.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—Mr. President: I think Dr. Johnson does very well to raise the clarion note of conservatism in the treatment of diseased ovaries. Conservatism is a word which, under different dates and methods, is capable of a very different interpretation. In the time of Sir Spencer Wells conservatism meant that when a man opened the abdomen and removed an ovarian tumor, if the other ovary was sound, he did not take it out. It was an extensive practice at one time in this country to invariably remove the opposite ovary for fear that at some future time it might become diseased. That matter might have been settled at a much earlier date than it was by an investigation of the interesting statistics that Sir Spencer Wells gave us in his tables of a thousand laparotomies. I find by going over them that in 1000 women the opposite ovary was left, and that 228 of these were married and under forty years of age; 120 of these 228 women gave birth to 230 children, showing the advantage of leaving the opposite ovary. The disadvantage would be the liability to a recurrence of the disease. Of the 228 women operated on, in 15 cases there was recurrence of the disease, and they were operated upon again, and one died of a condition which was doubtfully ovarian. So we have a doubtful death against over 200 children born, and this settled this particular phase of the question of conservatism. Conservatism has recently come to mean something very different. It means the sparing of structures or parts of structures which are not diseased and which may be of some value to the woman, as well as structures which are diseased, but may be left with the possibility of becoming

regenerated. The developments of conservatism which have taken place within the last few years constitute the best part of our work, and I feel that if the principle of conservatism was wiped out I would not care to practice gynecology as I did twelve years ago. We break up adhesions, we sometimes drain pus, and we should always give pelvic abscesses a chance to drain by the vagina and get well before enucleating them. We sometimes, in fact, drain pus tubes even after opening the abdomen. I would ask you to bear in mind earnestly, and I would insist emphatically upon this principle, that conservatism is most applicable to the inflammatory group of cases. We have been very great sinners in removing ovaries that are only involved in an inflammatory exudate due to the accident of their position. The disease travels through the uterus and tubes into the pelvic peritoneum, and because the ovaries happen to be near by and are covered with adhesions, we have been in the habit of removing the ovaries and tubes; whereas one ovary was, perhaps, an innocent, unoffending organ, perfectly able of carrying on its function if left, and should have been left to carry on its function.

The advance that has been made in myomectomy is one of extreme importance. I have removed as many as fifteen myomatous tumors of the uterus, and yet left the uterus *in situ*. At the Nashville meeting of the Association I believe I removed thirty small myomatous tumors, or at least showed the possibility of doing this, leaving the uterus intact. While we are conservative, at the same time we must exercise judgment in our conservatism. One of the objects of conservatism in these days is to preserve fecundation. We must preserve a tube or part of a tube. I had a striking example of this kind in a case that came to me several years ago, the wife of a doctor, who was one of my warm friends. She had suffered a great deal, and although it was difficult to tell what the trouble really was before opening the abdomen, on opening it I found the following condition: Let this diagram represent the superior strait of the pelvis (illustrating). The uterus, perfectly normal, lay in the middle. On the left side there was a large hæmatoma of the ovary. The ovary was converted by a blood-clot into a perfect shell. There was no ovarian tissue visible, so I could not take out the hæmatoma and sew together a strip of sound ovarian tissue, as I not infrequently do, preferring this to removing it. The tube was

sound. On the other side, on the contrary, we had a little bulbous tube, like a piece of wire, rigid, contracted, without any apparent lumen at all, and a perfectly normal ovary. I took out the diseased ovary and tube, removing structures which could not possibly regenerate or be of any service to the patient. After this she menstruated, and within one year became pregnant and had a baby.

The general principles of conservatism should be these: We should endeavor to preserve all the organs, or at least a set of organs sufficient to carry on fecundation. Next to that, if we are obliged to destroy or remove one, the least important is the tube. If the tube is taken away, leave the uterus and the ovary, because the woman will then continue to menstruate regularly and will be relieved from the distressing nervous sequelæ following a double ovariotomy. If anything is to be taken away, let it be the uterus, thereby stopping menstruation, leaving the tube and ovary. Patients do not suffer from nervous sequelæ and distressing flushes when a piece of ovary is left on one side, so that in the worst cases our aim should be to preserve at least a small fragment of this most important organ.

Dr. I. S. Stone, of Washington, D. C.—I would like to ask Dr. Kelly whether he would remove the uterus if it is normal, in the class of cases under discussion?

Dr. Kelly.—We sometimes have typical hemorrhages; the uterus becomes displaced, and I have had to open the abdomen again in such cases to remove the uterus. It is technically correct to take out everything rather than to leave the other structures.

Dr. Stone.—Your position is not consistent with the suggestions offered by Dr. Johnson. He suggests, as I do, leaving every inch or portion of the body which is supposed to be normal. I cannot agree with Dr. Kelly as to that part of his remarks, although I am fully in accord with him in other respects.

Dr. Kelly.—It is an apparent contradiction, but I stick to it.

Dr. Stone.—Dr. Kelly says that he would cut open or remove the uterus to see what is the matter inside, as it only takes, perhaps, fifteen minutes or more to do this. It seems to me the doctor should be very careful not to suggest anything which ought not to be followed, because so many men emulate him in his work. We have often heard men speak of a death-rate of 3

or 5 per cent. after hysterectomy or some such operation. Even in the hands of the best operators it is not fair to claim such results. When we do hysterectomies we ought not to tell patients that we get 5 per cent. mortality. It is not fair to them.

Coming to the discussion of the paper proper, it would require a great deal of assurance on my part to advance any opposition to the points enunciated by Dr. Johnson. We all acknowledge his experience, and there is no way for us to deny any of the propositions he has laid down. But, as is generally the case, we find the pendulum swings back too far, and it is fair to mention that in our efforts to conserve organs we may do harm. When a man has worked out his own problem, as Dr. Johnson has done so satisfactorily to himself, and has found conservatism as he represents it, it is all well and good. But, on the other hand, we know that in many cases conservative operations are very unsatisfactory. I cannot take the time to discuss the whole paper, but there are one or two points to which I desire to call attention.

In the surgical work done at the Columbian Hospital in Washington, operations are undertaken for conservative purposes—at least, in my service, so far as the enucleation of pus tubes is concerned. During a period covering nearly two years of surgical work in that hospital, only one death occurred from the radical enucleation of pus-sacs by the abdominal route, and this case was one in which conservatism was practised. That is why I mention it. There was pus on the left side, and an effort was made to clean out the tube on the right side and leave it. I was unable to have an examination made of the pus, as Dr. Kelly has suggested, during the operation, to see whether it was sterile or had gonococci in it. On account of previous experience, the tube was left. The patient had obstruction of the bowel from its adhesion to the ovary and tube, which were left, and she died.

As far as pus cases are concerned which were evacuated by the vagina, one woman died within twenty-four hours from a simple vaginal puncture. This patient was too weak to give an anæsthetic for half an hour. When we know that a patient cannot tolerate anæsthesia for any great length of time we should be very cautious about operating. We made a vaginal puncture, put the woman back to bed in ten minutes, yet she died from shock, partly from anæsthesia, because of sepsis.

Another patient was operated on by vaginal puncture three times, opening up different abscesses and evacuating the pus, and yet the patient in the meantime was suffering from sepsis which could not be reached through the vagina. We made an exploratory operation later on, but finding the patient was getting worse, the pus burrowing up as far as the kidney, the abdomen was closed without any good results whatever. This patient had multiple abscesses which had disseminated themselves, burrowing far up. Investigation was not carried far enough to determine where the pus went.

Conservatism is well and good in its place. We must acknowledge the principles of conservatism laid down by Dr. Johnson as correct; but we cannot go so far as to leave important involved structures. If we have an abscess of the appendix we can do very little good by simply opening it, because in opening up the pelvis through the abdomen complications may present themselves which call for more radical interference. It may be well to resort to vaginal puncture in such a case, but everything has not been done when we are satisfied ourselves that vaginal puncture will disclose other conditions. We have, found time and again, that the appendix is involved; that pus is burrowing into the bowel; that other complications too numerous to mention present themselves to us in opening the abdomen which would never be cured by mere vaginal puncture. I do not wish to be understood as refusing to make vaginal puncture when it is necessary. Dr. Johnson and others may, perhaps, thinks I am entirely too radical and do too much abdominal surgery, but when the ovaries are involved; when we have associated with their involvement visceral complications; when we find it is possible to reach the adhesions of the omentum and other viscera, we realize that abdominal surgery is of paramount importance, and that it is necessary for us to do sacrificial surgery in such cases.

Dr. L. S. McMurtry, of Louisville, Ky.—The paper by Dr. Johnson is one of the most classical expositions on this subject that I have ever heard. I indorse it, and only rise to occupy the attention of the Association on account of the importance of this subject. Conservatism demands the preservation of life first, the conservation of function and health second, and that principle will be found to pervade the paper from beginning to end. I cannot use language too strong in indorsing the essayist

entirely until it comes to the point where he presents some work upon the conservation of the ovary and function, and which he illustrated very beautifully by citing an appropriate case of hæmatoma of the ovary, preserving the organ when only one-third of its substance was involved. It was a beautiful illustration of conservative surgery of the pelvis, which marks one of our great surgical advances. There is a field of operation to which the essayist might have addressed his attention, which he did not do, and that is the principal point I desire to present. I have known men of active work in pelvic surgery to report eight consecutive cases of operations upon the uterine appendages without a single death. Now, the same kind of reports can be made of long lists of operations for conservative work upon the uterine appendages, and just in line with this. If you will take the work and analyze it, you will find we have a difference in practice among abdominal surgeons as to what class of cases require an operation at all. I believe that whenever a man does a hundred or more consecutive operations for disease of the uterine appendages he has got a large proportion of cases that do not require any operation at all, and this is where conservatism should begin in not operating in every possible case. It is the first and most important step in conservatism. We need to have a little more work done in that line. This was the greatest sin in the early years of pelvic surgery—of performing operations for removal of the appendages when no operation was needed. Operations at that time were undertaken for neurotic conditions, for minor cases of catarrhal inflammation so-called, which would eventually cure themselves. Conservatism should begin by limiting to a certain extent the scope of operation, and operations should be restricted to cases where there is greater danger to the patient's welfare from the disease than from the operation.

In regard to operations upon the Fallopian tubes and ovaries, I think there is a great field for conservative work in those mild cases where the symptoms are not very urgent, and here it is a question as to whether or not operative interference is justified as much as it is resorted to, because opening the abdomen is not the trifling operation that it is oftentimes regarded to be. It is always an operative step of considerable magnitude and of great importance. I call special attention to the fact that conservatism is showing itself in modern pelvic surgery markedly in

restricting the limit of operative interference in diseases of the uterine appendages.

In regard to the position of my friend, Dr. Kelly, his position is a very radical one, and with which I do not concur. But, of course, with Dr. Kelly it is the result of a large experience and of very profound and careful thought, and his remarks deserve respectful consideration. I cannot understand a conservatism that will take fifteen tumors out of the uterus and preserve the uterus; and then in the next instance remove the uterus when there is no tumor in it at all, because it is technically more easy to remove a uterus. It seems to me that here is a marked inconsistency. I would take the uterus out that has got fifteen tumors in it, and I would leave the uterus when it is healthy or not diseased. That is the difference between us in regard to practice. When we have seven or fifteen intramural fibroid tumors of the uterus to deal with, it is better to remove the uterus than to spend an hour and three-quarters in enucleating small tumors in a hemorrhagic field, leaving a large amount of foreign material in the uterine cavity and trying to preserve it under the name of conservatism. It seems to me conservatism is best subserved by removing a uterus which has undergone such neoplastic development.

In regard to operations upon the uterine appendages, we have done little so far as suppurative conditions are concerned to improve the work of Lawson Tait. His work in connection with suppurative disease of the appendages and in ectopic gestation is among the greatest triumphs of all the work he has done. When we have suppurative disease of the appendages, the suppuration having extended to the ovaries and tubes, to enucleate the tubes and ovaries, tie them off close up to the cornu of the uterus on each side, to carefully ligate, if necessary, the broad ligament far over toward the brim of the pelvis, to do the enucleation carefully without rupture and have the patient get well, is one of the most perfect instances of rescue of a patient from an extreme condition that I am acquainted with in the entire range of surgery. I have operated upon many such case as far back as seven or eight years ago, and I have not seen any inconvenience from retention of the uterus. The patients have not had any trouble with their uteri afterward. If the uterus is placed in proper position, it drains itself naturally, and it under-

goes rapid atrophy after the removal of the appendages. We know that Dr. Kelly is a rapid operator, but I am sure that there are few men who can complete the entire excision of the appendages and the uterus under these circumstances in the time that they can remove the uterine apendages and leave the uterus alone. It adds much to the gravity of the operation.

Dr. J. Wesley Bovée, of Washington, D. C.—I am very glad to see that there is considerable conservative work being done on the ovary. I have done some of the work described by Dr. Kelly with his diagrams on the blackboard, of removing, for instance, the Fallopian tube on one side and, if necessary, the ovary on the other side. I have attempted to bring about the point he has made of bringing the tube in close contact with the ovary of the opposite side by taking a few stitches in the posterior surface of the broad ligament on the side having the Fallopian tube left. I have often thought, although I have not carried it out, of removing the ovary in some cases on the one side and transplanting it to the other side, stitching it to the Fallopian tube where it could get its blood-supply. I have found the ovarian extract of considerable benefit in these cases—that is, where I leave parts of ovaries, and I have noticed great improvement in the condition of patients after taking the ovarian extract. I am not prepared to say, however, that this improvement is entirely due to the extract. Some of the ovaries I have saved have been dug out of beds of adhesions and held together by mattress sutures put through them in different directions, and hoping by the stimulating action of the suture to bring about a certain amount of regeneration in the structures. I have sometimes thought that I was too radical in that direction. However, I have yet to find a case in which I had to regret having taken this extreme position.

Dr. Ernest S. Lewis, of New Orleans, La.—In rising to discuss the paper last read, its conservative tone receives my warmest commendation, and accords with my present views regarding the treatment of pus tubes. Long before abdominal sections were practised for the relief of these cases, purulent accumulations were evacuated per vaginam and drained, and these patients made good recoveries, and some of them subsequently bore children. Deaths were so rare from these affections, notwithstanding the septic condition, protracted confinement to bed, and great

emaciation, that in lecturing to my class I have repeatedly said that women rarely ever died from suppurating tubes and pus collections in the pelvis. It is far safer to evacuate the pus when in quantity, through the vagina, and subsequently, when the patient's condition has improved, to enucleate the tube by abdominal section, should it become necessary. In a large percentage of the cases, however, it is not necessary. When both tubes and ovaries are removed the uterus should be anchored. Its removal is an additional risk to the patient, and unless anchored it is liable to prolapse, or other displacement, causing much discomfort and nervous disturbance.

Dr. Johnson (closing the discussion).—There are so many papers on the programme to be read, and my paper has been so thoroughly discussed, that I will make no extensive reply. I wish to thank the various gentlemen who agree with me, and I am equally grateful to those who opposed such points as they thought best.

As to Dr. Stone's criticism, I can hardly attempt to reply to it without opening up a large field for discussion, and we have not the time to do it now. If time permitted, I should be glad to occupy about four hours in discussing certain points in regard to the conservation of the genital organs.

Dr. Lewis has kindly said many things which I would have said in reply to the suggestions of Dr. Stone, and he has probably said them better than I could, because of his larger experience and greater judgment. I indorse fully what Dr. Lewis has said regarding conservative procedures, leaving the result to subsequent events. If it should turn out later on that a patient requires further operative procedures they can be instituted when she is in a better condition to stand them.

WHEN SHOULD WE OPERATE FOR APPENDICITIS?

By A. Morgan Cartledge, M.D.,
Louisville, Ky.

After a controversy that has rarely had an equal in the history of medicine, appendicitis has about passed from the domain of medicine into that of surgery. It is interesting to those who have been engaged upon the one or the other side of this controverted subject to review its history and incidentally the evolution of our knowledge of the disease.

I may claim the distinction of having been one of the earliest to buckle on armor and enter the ranks as an advocate of surgical interference in most cases of appendicitis. We have arrived at a state of knowledge upon this subject that would make the early attacks and responses seem puerile indeed.

In the impetuosity and enthusiasm of youth I thought many of these attacks of physicians were obstructions cast in the pathway of progress, and to be met by the most vigorous argument. I now think the warfare was a blessing, as in all great evolutionary strides active warfare becomes a necessity. While discussing one phase of the subject light was turned upon another, until to-day we are in possession of an immense storehouse of well-classified knowledge upon this fatal malady of human beings.

The valuable contributions to the pathology of appendicitis by Fowler, in 1893 and 1894, and the author's contribution upon the same subject (*Transactions of the Kentucky State Medical Society*, 1894) have been accepted by the profession as correct. The diagnosis, with its possible errors, has been frequently dwelt upon by various authors. The opera-

tive technique has reached a high degree of perfection as the result of the varied experience and contributions of surgeons. The study of the clinical history has done much to throw light upon the probable results of operative procedures when practised at different periods of the disease. With the exception of an occasional gun from some sturdy old knight of the opium and poultice era, appendicitis has, by well-fortified arguments, come to be considered a disease to the treatment of which a surgeon should be a party.

The discussion is no longer between the physician and surgeon as to whether appendicitis is a medical or surgical affection, but is between surgeons as to the time and feasibility of operation. The enthusiasm born of improved results after operation has caused this question to be lightly brushed aside by some surgeons who have cast wide-spread throughout the country the simple dictum of "Operate as soon as the diagnosis is made." Now, by way of counselling moderation and care, both in assertion and action, it is necessary to observe that we are considering the treatment of a disease of manifold types and pathological manifestations; that unfortunately we of necessity see patients for the first time in any one of several stages; and that by universal agreement operative procedures have the most varied terminations, dependent upon the stage in which the operation is performed.

Again, that the advice, whether hasty or wise, of those in a position to authorize, will be practised by the thousands doing only a limited amount of this work, and consequently not so competent to deal with the difficulties which so frequently arise in complicated and septic examples of appendicitis.

When we consider how great is the mortality to life in this disease, these reflections admonish us to ponder well the advice we give in dealing with this intraperitoneal monster. If my views upon all surgical subjects had undergone as many changes as those upon the treatment of appendicitis the sum total of my knowledge would be a chirurgical kaleidoscope; and yet I feel that each change of opinion has tended to better my appreciation of the intricacies of this subject.

To those who say operate in every case as soon as the diagnosis is made I can only reply that I hope our technique may become so perfect as to master every obstacle that may arise at any stage of the disease, but until then I must decline, and do what I think is best for my patient. If a dozen surgeons see a patient with appendicitis in consultation there will be little, if any, disagreement as to the best course to pursue; but let them engage in a theoretical discussion of how to treat such a patient, and they will disagree widely. The trouble is they are thinking and talking of different conditions, each judging from his own theoretical stand-point. This would imply, and correctly so, that the personal equation enters largely into the subject. A surgeon who has, from the conditions of his practice, had to deal usually with neglected cases of suppurative appendicitis, is better able to judge of the danger of operations for appendicitis; a surgeon whose early training in this disease embraced a large per cent. of interval cases is apt to be impressed with the safety of operations for appendicitis, and coupled with this thought is the deeper impression a neglected suppurative case produces upon his mind; hence his urgent appeal to operate as soon as the diagnosis is made. This is good advice if we could see patients when first attacked with the disease; by this I mean the first twenty-four or thirty-six hours. A surgeon seeing and operating upon a great many favorable cases is apt to be so impressed with the advantages of operation as to overlook the high mortality in the third and fourth day cases; these have been so few in his large list as not to materially do violence to his statistics. In order to correctly estimate the value and wisdom of operative measures it is positively necessary to discriminate in regard to the stage of the disease and the condition of the patient.

We become reckless in our assertions and deductions because of our victory over the physician's position—that medicine cured more than surgery. It has about been accepted by the profession at large that of one hundred patients with appendicitis of all varieties treated by a skilful operation a

greater number will recover than a corresponding number treated medically. The next step for surgeons to consider is the possibility of still further improving the statistics in appendicitis by declining operation in a certain per cent. of cases and deferring it in others. My experience leads me to believe that such a course, when founded upon mature judgment, will lead to the best results. Richardson and Brewster (*Boston Medical and Surgical Journal*, July, 1898, Appendicitis—Remarks Based upon a Personal Experience of 750 Cases, Including 150 Consecutive Cases Successfully Operated upon in the Interval) say: "The danger of converting a localized into a general infection by operating under certain conditions ought perhaps to receive more consideration than it does. This type of case is seen most frequently on the third or fourth day, though the patient's general appearance, temperature, and pulse may be good. It will be noted that an operation, even the most rapid, will be attended by an immediate constitutional depression deep enough to excite the gravest alarm. It is idle to contend that this or that method of treating the general peritoneum will give the patient more than an inconsiderable chance. In view of the cases of similar severity and similar local signs which have recovered without operation, and which have later been subjected to the so-called interval operation, it seems to us clear that the question of interference on the third or fourth day should be most carefully considered."

In this report referred to are 464 acute cases of appendicitis; 31 were moribund when first seen, which left 433 cases to be treated; 284 were operated upon, with 63 deaths, or a mortality of 21 per cent.; 149 acute cases recovered without operation, some of which were afterward included in the 151 consecutive cases successfully operated upon in the interval. I think we are justified in believing that after a patient has lived four days with appendicitis the chances are better for recovery from that attack to health or a safely operable condition than if subjected to operation at a time when adhesions are imperfect and the system laboring with the effects of

sepsis from a local storehouse of infection which nature will most probably render harmless in a few days.

With an improved operative technique we approach these cases with much less anxiety than formerly; but the fact remains that operation in the most experienced hands in this stage of the disease has a fatality equal, if it does not exceed, the expectant plan by medical treatment. This reasoning applies only to the attack the patient may then be suffering from. He should submit to interval operation with its safety, to guard him against subsequent damage from the disease. I believe it is safe to assume that 98 per cent. of those who die from first attacks of appendicitis have the fulminating variety of the disease, and an operation to do any good in such cases must usually be performed within the first twenty-four hours from the onset of symptoms. In view of the fact that we possess no means of knowing in the beginning the cases which will be fulminant and those which will pursue a less dangerous course, it is the best surgery to operate upon all cases seen in this early stage. After this primary stage the second, or what may be termed the septic stage, supervenes and continues a variable time, according to the nature of the lesion and its treatment; if ulcerative or so-called catarrhal, a fair degree of resolution may safely be expected in a few days; if perforative with localized peritonitis, a safely walled abscess may be looked for, with an improvement in the constitutional symptoms and a condition which gives better assurance of success from operation.

The deplorable burrowing of pus in attempts at escape will not occur in the practice of watchful surgeons, who will evacuate it before such advanced secondary sepsis occurs. In the writer's opinion the usually accepted conclusions in regard to late operations in fulminating appendicitis are in great need of revision. In advising that we should operate less frequently in cases that have passed into the stage of general septic peritonitis I plead guiltless of the charge of attempting to avoid an operative death and not giving the patient his *only chance* for recovery. I am not convinced that of 100

patients with general septic peritonitis a larger number will recover by section, irrigation, and drainage than by expectant medical treatment. Of thirty such cases from various causes subjected to operation I have had a mortality of 100 per cent.; of probably fifty others, observed without operation, I have seen two unmistakable cases recover. This statement is made with a full knowledge of the not inconsiderable number of such cases reported cured by operation, several of which I am convinced were cases of beginning general septic peritonitis, and many of which I feel equally convinced were cases of rather widely disseminated yet localized peritonitis. After an experience embracing more than a thousand abdominal sections I am frank to say that I do not believe sufficient evidence has been adduced to cause us to believe that the peritoneal sac, when universally inflamed as the result of pathogenic bacteria, can be cleansed and the septic and of necessity semimoribund patient survive the surgical interference. That nature, assisted by stimulants and purgatives, may save at least 5 per cent. of such cases seems reasonable. If operation is resorted to under such circumstances a rapid removal by small incision of the gangrenous appendix, and the introduction of a small drain to attract localization, seems to promise better results than prolonged attempts at impossible irrigation of the peritoneal sac. Where possible, the operation should be done with local anæsthesia, and immediate and vigorous purgation instituted.

Conclusion 1. Probably 98 per cent. of the patients who die of acute appendicitis without operation have the fulminating variety of the disease; operation, to be of service, must be done in the first twenty-four hours—better the first twelve.

Conclusion 2. In view of the fact that we have no means of knowing the probable course of a given attack of appendicitis, operation, when possible, should be performed within the first twenty-four hours after the onset of symptoms.

Conclusion 3. Patients seen after the third day should not be operated upon until after the attack, or until purulent formations, if such take place, have been walled off and the

patient practically rid of general sepsis. The exception to this rule is the rupture of an appendiceal abscess into the peritoneal cavity (a very rare accident), when abdominal section should be immediately performed.

Conclusion 4. Probably as many patients recover from general septic peritonitis by stimulants and purgatives as do by operations. In either event, if it is a case of true general septic peritonitis the mortality will not be far from 95 per cent.

Contributions to medical literature would indicate that there is a sad need on the part of the profession of more definite views as to the nature of this disease. If operated upon at all no attempt at general cleaning of the cavity should be practised; quickly assist nature to take care of the desperate patient by removing the source of the fire; to do more is to add the shock of an unbearable operation to an already nearly exhausted vitality.

Conclusion 5. Subject to interval operations patients who have suffered an unmistakable attack of the disease.

Conclusion 6. Do not operate too soon after a severe attack with many adhesions; the operation will be greatly simplified by waiting a few weeks longer; in the meantime keep the patient upon light diet and little exercise. Patients do not usually have a recurrence until the adhesions or splints have been removed by absorption. The mortality from interval operations should not be more than 1 per cent.

DISCUSSION.

Dr. Louis McLane Tiffany, of Baltimore, Md.—Mr. President: It seems to me the position surgeons take with reference to appendicitis as a whole is extremely wrong. What is needed is a differentiation of the form of appendicitis that one is called to treat, and I thoroughly accept what has been said by Dr. Cartledge, that appendicitis is a disease which requires the presence of the medical man as distinct from the surgeon, and the two should go hand-in-hand. The surgeon should know when to

hold his hand quite as well as when to operate. Personally, I cannot tell the form of appendicitis present in the great majority of cases; consequently, I am unwilling to accept the dictum that we should operate in all cases in twelve hours after the commencement of the trouble, because we do not know what is going to happen. To accept such a dictum we would be compelled to operate at the end of twelve hours for any number of cases of indigestion, for appendicular colic, etc., and I am afraid I cannot accept it. If I were clever enough to diagnosticate the form of appendicitis when called in, it would be all right; but I cannot do it. I do not believe one case in seven of appendicitis comes to operation. Many cases do not need it. They get well without it. Let us say one case in eight of appendicitis comes to the operating-table. The most successful cases are those that are operated upon before the disease has advanced to any great extent. Before the peritoneum is involved, and when an operation is done in such a case, the appendix taken out, the stump turned into the cæcum in a clean way, it is successful. The surgeon who operates in every case, in my opinion, will do so upon a number of cases which do not require it at the time of surgical interference, and would have recovered without it. The other set of cases that are just as successful are those operated on between attacks, and unless there is something very extraordinary present they all recover.

I entirely agree with what has been said by the essayist, that all cases of appendicitis should not be operated upon immediately after the attack, because there will always be adhesions, and these adhesions diminish, so that as time goes on an operation for the removal of the appendix, done, say, a month after the attack, will be very simple; whereas, immediately after the attack it would have been much more difficult. The adhesions are very vascular, and drainage is usually required after an operation following immediately the attack; whereas a month later everything can be closed, and the section is a comparatively simple one. I do not mean to suggest that any abdominal section is simple, because we have to consider the preparation of the patient, the investigation of the kidneys, the preparation of the bowels and skin, the preparation of the patient locally the day before operation, and then at the time of the operation the preparation of the dressings. All these things we recognize as necessary parts

of an operation. A section is not a simple thing, because we undertake to do something that directly involves the patient's life, and the only reason we do it at all is because there is something worse inside, and in order to do the operation with the least danger we go through this preparation of the patient. It is my habit always to view a case of appendicitis as I do anything else which may involve the life of my patient. It is not, in my opinion, under any circumstances a simple procedure. We recognize the gravity of the operation, and we take precautions and make preparations to avoid doing any operation which may be in itself fatal.

In regard to the conclusion that after the third day it is probably unwise to do an operation, I am not able to tell what is going on inside of the belly by the third day. There may be an abscess; there may be infected fluid which is shut off by more or less dense, strong adhesions. To leave that inside with the possibility of having a rupture take place is extremely wrong. It is largely a question of a careful and accurate diagnosis. I know that I cannot always make a diagnosis as to what is going to happen about an inflamed appendix within three days. I am utterly unable to make a prognosis, and if an individual has been ill for three days, and that, therefore, I should not operate save between the attacks, I am going beyond what I know. It is true, in some cases I think I can tell; but it is beyond my diagnostic power to know what is taking place within the abdomen in all cases. It is a question of seeing the patient very often. In some cases a fatal peritonitis will take place between two visits. Those are the cases where there is infected fluid somewhere walled off by adhesions, these adhesions give way, and the septic material (it may be only serous) is poured into the general peritoneal cavity, followed by general infection. It is best to operate before anything happens. It is good to operate between attacks; but when an attack is present it is a volcano. I watch the patient's temperature and pulse, and I operate when I think there is cause for it, letting the patient get over his attack if he can, because I will operate more successfully if he does so. But if his temperature and pulse, etc., do not continue to improve, then I operate, no matter what the day of disease may be.

Dr. J. Wesley Bovée, of Washington, D. C.—I believe the rules that Dr. Cartledge has formulated from his wide experience

in this line of work are as nearly correct as any set of rules can be. That is all I have to say on the subject.

Dr. H. H. Grant, of Louisville, Ky.—I have long been of the impression that in order to secure the well-being of the patient some definite rules should be formulated and accepted by the surgical profession and presented to the general practitioner as data from which conclusions could be drawn, so as to insure to the general practitioner the security of his patient, and I have long believed that the *uncertainty in the minds of surgeons* was the occasion of the failure on the part of the general practitioner to co-operate with them and to allow them to perform operations at the time their judgment indicated. I have been unwilling to subscribe to any positive dictum which declares that operation should be done in the first twenty-four or first thirty-six hours, because, as we all know, this is a period in which the disease is only progressing to its height. This is a time in which it is difficult to persuade the members of the family and the general practitioner that the patient will not safely pass through the attack. It leaves in the mind of the general practitioner the very strong probability that his patient will pass into that period which, after the fourth day, Dr. Cartledge declares the patient should be let alone. I firmly believe that if all patients were under the care of a skilful surgeon and operated upon in the first twenty-four or thirty-six hours, the mortality would certainly be materially reduced. I believe, at the same time, that this ideal cannot be reached, nor can the general practitioner be made to accept it as the treatment to which he desires to subject his patient; consequently, I am afraid to accept positive dicta of this kind, and have been disposed to believe that it is better to allow the patient to be watched carefully by the surgeon during the first twenty-four or thirty-six hours, if he continues to do well, and if at the end of this time his symptoms do not indicate that they have reached their height or have not begun to decline, an operation should be done. On this question I differ with Dr. Cartledge.

With respect to the second conclusion he arrived at, that patients should not be operated upon after the fourth day, I believe a little more discretion should be allowed the surgeon than his statement would indicate he is disposed to grant. A number of patients after the fourth day are very sick. This is the time when there is great anxiety in the family and in the mind

of the general practitioner. It is the time when the general surgeon assumes a very distressing amount of responsibility in declining to operate upon a patient who is in a grave condition. If he declines to do anything, and the patient does not get well, he takes the odium of responsibility at a time when everybody else is disposed to shift it upon his shoulders. This is the time when the practitioner wants an operation done. If anything is to be done, he thinks it should be done then. In a considerable number of cases where the progress of the disease is not in a measure arrested; where the temperature continues to be high, especially if distention of the abdomen continues, an operation had better be undertaken than to wait in the hope that general peritonitis or rupture will not take place. For this reason I am disposed to operate upon cases after the fourth day where the symptoms increase in gravity, rather than take the chances, which, according to the statistics that Dr. Cartledge gives from the literature of the subject, appear to indicate, will terminate even more favorably without operation. My experience is very favorable as regards operations done under conditions of this kind, and they are not so disastrous as reported in the paper by Dr. Cartledge.

With respect to operation during general peritonitis, I have been rather fortunate recently in operating on two cases for general peritonitis, although I am not disposed to say that my experience will serve as a guide in future work along this line; at the same time, I have always felt that an individual affected with a general inflammation of the peritoneum is in an almost hopeless condition. As we have learned here to-day, it is impossible to determine the character of the peritonitis, and whether or not the abscess, the result of perforation, has caused it, or whether the general septic condition has resulted in septicæmia, cannot be determined. Under those circumstances I feel it is our imperative duty to give the patient a chance from an incision of the simplest character and the drainage so obtained. This is not altogether a question of theory, but, as I have previously said, recently I have seen two cases, both of them of the most desperate character, each presenting upon incision evidences of perforation, and one of them gangrene of the appendix. In both instances the appendices were entirely loose in the peritoneal cavity, and in both instances fecal concretions were washed out by irrigation after the incision was made.

These three conclusions at which Dr. Cartledge has arrived, it appears to me, are at least susceptible of some question, and I am not disposed to accept them as positive conclusions. As to the other conclusions, in a general way, I have felt that his paper has indicated a very wise course to pursue, and the individual experience of each surgeon will of necessity control him a good deal in his operative steps.

Dr. William E. Parker, of New Orleans, La.—I do not know of any condition that calls for greater judgment on the part of the surgeon than appendicitis. I believe that there are cases of appendicitis that can be safely waited on, while there are others on which we cannot operate too soon. To decide as to which cases to operate on and which cases to let alone, depends upon the judgment and experience of a given surgeon. I agree with what Dr. Cartledge had to say in reference to conclusion No. 1. As to conclusion No. 2, I think each individual case must be taken on its own merits, and that no hard or fast rule should be made as to whether the case should be operated on in twenty-four hours or not. I have seen cases that have gotten well without operation, where I thought no operation should be attempted, and I have seen others where we could not open the abdomen too soon. I agree fully with conclusion No. 3. As to conclusion No. 4, I believe laparotomy and washing out the belly and using drainage will offer a good deal more than stimulants or purgatives. I fully coincide with him as to the other conclusions, and taking them all in all, they are about as safe to follow as any I know of. There is no class of surgical troubles where cases should be taken on their own individual merits more than in this disease.

Dr. Howard A. Kelly, of Baltimore, Md.—Everyone practising gynecology will remember the facts in regard to extra-uterine pregnancy. We now know that a great many patients with extra-uterine pregnancy in which rupture has taken place have severe colic at the menstrual period. Although patients may recover from extra-uterine pregnancy, we believe in operating at once whenever the patient has such a condition. That is also my position in regard to appendicitis. If it is known *argumentum ad hominem* that I have appendicitis I want to be operated upon at the earliest possible moment, as soon as a competent surgeon gets to me; and I should insist on operating in all cases as soon as the diagnosis is made, without reference to

the stage of the disease. I believe the times designated by Dr. Cartledge are most favorable for operation, but I should not hesitate to operate at any other time. If on the third or fourth day, or later, we are going to operate upon a case of appendicitis and wish to follow the most convenient route—if this diagram represents roughly the area of induration—I should make the incision over the point of greatest prominence. In many cases, especially those in which it is impossible to determine the exact extent of the disease, I should make the first incision nearer the semilunar line into the peritoneal cavity, so that through this incision the limits of the disease may be made out. Finally, make a parallel incision an inch and a half away, getting at the inflamed area, and if there is pus, to the head of the cæcum, putting in a drain, after making vigorous attempts to get out the appendix. I have found this second incision of extreme value in such cases. In a few instances I would open the abscess transperitoneally. We cannot always tell when general peritonitis exists. We have found general peritonitis where we did not know it existed when the operation was begun. If the patient is in good condition, the coils of bowel can be taken out and wiped off carefully. If the case is an asthenic one, I wash out freely, using extensive drainage, and feeling sure I can occasionally save cases under such circumstances.

Dr. W. B. Rogers, of Memphis, Tenn.—I do not know that I can add anything of particular interest to what has already been said regarding this subject. I fully concur with the other gentlemen, that these rules are as good and as sound as any that can be laid down for appendicitis, but I should like the privilege of making as many exceptions to each rule as appeared satisfactory to me at the time. I am to a great extent a subscriber to the rule that operation for appendicitis should be done at once or as soon as we get ready for it, with this exception, "if there is no contraindication to it." I have been called to cases where the indications to operate were as clear as possible; at the same time, the indications were that the patient would die on the table. I do not believe such cases should be operated on. I confess I am unable to tell which case is to be a perforative case. It is exceedingly difficult to lay down definite rules and follow them. The particular case and condition of the patient should guide us at the time. I have never seen any set of rules that I could

subscribe to with any degree of satisfaction. It is much like rules laid down for operation in cases of injuries of the skull; the rules look very nice on paper, but when you are confronted with a particular case you must exercise some discretion and not rely on rules.

Dr. I. S. Stone, of Washington, D. C.—It seems to me that Dr. Rogers covered the ground very nicely when he said that we could not follow any set of rules in our surgical work. Rules are admirable for the purpose of discussion, but not for surgical practice. When we are called to see a patient we are guided largely by the indications of that particular case rather than by any formulated rules. Every one of us will exercise great care, and although we may have a set of rules before us, we will either forget or disregard them and apply our judgment to the case in hand.

Dr. Kelly mentioned a point with regard to the presence of an infected area about the appendix, which I desire to emphasize. I think Dr. Kelly would keep inside, as far as possible, the infected area, and if pus be present drain it. He would scarcely take the time to break up the adhesions and attempt a perfect toilet of the appendix or bowel. I believe that is the position he takes, and it ought to be the position of all of us when such a condition exists. In a large number of cases men have advocated breaking up adhesions resolutely and determinately, destroying every vestige of adhesions between bowel surfaces, and making a perfect toilet. I am glad to see that surgeons are not disposed to take such a view of appendicitis to-day. We have gotten beyond that. Nature may have walled off the area of infection, and if we separate adhesions in such cases, we may extend the inflammatory area, which may result in septic peritonitis.

In regard to general peritonitis, it seems to me there is a tendency to lay aside what we have heretofore considered as well-established surgical principles, one of which is drainage. In cases of localized septic peritonitis the indications are clear to give exit to pus or septic serum, which will inevitably in the vast majority of instances infect the general peritoneum. In such cases I contend that no harm can be done by incision and a certain amount of gauze or tubular drainage; but great harm can be done where we ignore that surgical principle and let the

patient take her chances. I am disposed to agree with Dr. Cartledge with reference to what he has said regarding this phase of the subject.

Before taking my seat I wish to call attention to an excellent paper which recently appeared, I think, in the *American Gynecological and Obstetrical Journal*, by Dr. Webster. I consider it one of the most important contributions to the treatment of infectious disease of the peritoneum that I have seen for several years. I do not wish to say anything against the wisdom of flushing the abdominal cavity or of using salt solution; but if a safe and efficient germicide can be introduced into a peritoneum which we know to be infected, and that agent will prohibit the development of germs or infectious processes, surely it is an agent for which we are looking. Webster has shown by experiments, in which he has deliberately infected the cavities of certain animals, notably dogs, with the streptococcus and other cultures, that he has prevented death in those animals from peritonitis by the injection of formalin solution. If you have not read this interesting contribution I would urge you to do so. It looks to me that possibly at the next meeting of this Association some of our members will be able to add further important information on this subject.

Dr. Richard Douglas, of Nashville, Tenn.—I would like to ask Dr. Kelly if he intended to convey the idea that he would leave the appendix undisturbed only in circumscribed cases; that when there is communication with the general peritoneal cavity he would even then sometimes leave the appendix?

Dr. Kelly.—I would not make a prolonged search for the appendix in such cases, if it was difficult to find it.

Dr. Douglas.—I will only discuss that feature of the paper. I do not think our practice would establish the correctness of the view taken by Dr. Stone. Where the adhesions are circumscribed and there is ultimately an area of infection, we should be content in doing sufficient to save the patient's life at the time. But I maintain that where there is evidence of general peritoneal infection and a communication with the general peritoneal cavity, with a pus area or open gangrenous slough in the appendix, under all circumstances, no matter what the adhesions may be, we should remove the appendix where there is a communication with the general peritoneal cavity. But where it is

circumscribed, our manipulations should be sufficient for the necessities of the case.

Dr. Kelly.—I am busily engaged in collecting certain statistics of foreign bodies in the appendix, and I shall be glad to hear from any of the members personally of interesting cases that they may know of. It may be surprising to the members, but the common pin is the only body which is found with any particular frequency. I have collected about twenty-six cases due to this form of mechanical irritant. It is found more frequently than any other foreign body, excluding fecal concretions.

Dr. F. W. Parham, of New Orleans, La.—My experience with appendicitis has not been extensive enough to go over the ground with anything like thoroughness, but I would like to say that I believe appendicitis should be considered as a surgical disease, and that all the medical treatment required to be given the surgeon should be competent to give. I believe, too, that when it is decided to operate upon a case the operation should be done as thoroughly as the safety of the patient will permit. I have recently seen a case which impressed this thoroughly upon my mind. I opened what appeared to be a simple appendicitic abscess, but before packing the wound, I thought it better to make further search; in manipulating the abdomen on the other side quite a quantity of pus discharged itself into the wound. The abdomen was only slightly distended. I suspected intraperitoneal pus. I made an incision on the other side in the semilunar line, pulled some coils of intestine out and found no pus. I closed this and went back to the original wound. I searched still further in the wound, enlarging it; a number of coils of intestine came down into the wound and became slightly smeared with pus. Finally, I succeeded in getting my finger into the pelvis and found there a half-pint of pus. I washed it out and made further search for the appendix. I irrigated freely. I inserted a tube through the abdominal cavity, the peritoneal cavity being well packed off with gauze from the upper end of the incision, which extended up nearly to the liver, backward to a point just inside the vertebral column, and effected drainage through that. The patient made a good recovery. This case, of course, impressed me with the possibility of ignoring to a certain extent infection of a limited surface of intestinal peritoneum. I think those experiments carried on in Baltimore show

that a certain amount of infection may exist with impunity, especially where salt solution is used. But we have not yet, at least I have not, arrived at that point where I feel I can safely disregard that general surgical principle which I believe is now well established, that in well-defined localized abscesses with a wall all about, we should desist from searching for the appendix at the time, and do only what is necessary to save the patient's life.

Dr. Cartledge (closing the discussion).—Just a word. The so-called rules in this paper were really conclusions based upon a study of observations in the different stages of the disease. I will say, that if the members insist on calling these *rules*, they are, like all good rules, made to be broken, and the latitude given was great. We all recognize that we cannot lay down hard-and-fast rules. I arranged my thoughts into conclusions, for we know much difference of opinion prevails at the present time in regard to dealing with this affection. The surgical profession is in a rather hopeless state of disagreement apparently. The profession at large, knowing that we are doing these operations, is guided by one or the other of these opinions. We have men who are supposed to be in a position to give good advice, some of them advising that we operate on every case of appendicitis as soon as the diagnosis is made. A man who has never performed but a half-dozen operations for appendicitis applies that rule to every case. He says it matters not at what stage he sees the case. The case may be one of hopeless general peritonitis, or the formation of a dangerous abscess on the fourth day, when he is incompetent to deal with it. He does not understand the walling off of the peritoneum like an experienced abdominal surgeon. The patient's life is lost under such circumstances, when in all probability statistics would show that the patient would get over the attack and be operated on at some future time.

This question is a serious one. We must acknowledge the competency of Richardson to make observations. He is a man who is seeking the truth. I do not know of any one man who has really had this subject at heart as he has, and he believes that more cases from the third to the eighth or tenth day will recover without operation than with it. Of course, this does not apply to appendicitis at large. No one can tell the first twenty-four hours a given course of the disease. Given a slowly progressing case, just a little thickness with constitutional disturbance, I

believe every surgeon would operate. What we need is to get rules of action in a general way better formulated in our minds, and do away with the dictum that has been spread broadcast that we should operate on every case as soon as the diagnosis is made, whether it be the first, the fifth day, or any other time. That is not good practice.

If in operating upon one hundred cases with a temperature of 103° and pulse 110 in acute sepsis, where there is walling off, you have ten deaths, if you can get as good statistics as Richardson has collected, 149 cases with such recoveries without operation, it is your duty not to operate on them. I do not approach these cases with the dread that I formerly did, still I lose a patient every now and then. We have a rather disappointed experience in seeing cases of localized peritonitis eventually terminate in a general septic peritonitis, and we feel in a measure that operation is responsible for this condition.

Dr. Tiffany says that he does not subscribe to operation for appendicitis in the first twenty-four hours, because he is not able to tell what form of the disease we have. That is the very reason I operate so early, because we get rid of the danger of the case becoming a fulminating one—a form of the disease which is so insidious that we may lose the patient in a night. He also says it is best to watch the case during the first two or three days. When a man has a pulse of 90, a rigid abdomen in the region of the appendix, and the diagnosis is unmistakably made of appendicitis, it is better to operate. If we make the diagnosis this afternoon, let us get things ready and operate this evening. Every good surgeon breaks hard-and-fast rules, because the conditions in some cases are so manifold that we cannot enumerate them. Dr. Kelly would operate as soon as the diagnosis is made, and I would like to say that this is a matter of personal equation. I have no doubt that Dr. Kelly has operated many times for appendicitis, and has operated many more times for interval appendicitis than for the acute disease. Every surgeon who has operated much in the interval for appendicitis is impressed with the slight danger attending operation.

URETERAL ANASTOMOSIS.

By George H. Noble, M.D.,
Atlanta, Ga.

To facilitate analysis this subject has been divided into two classes, viz.: ureteral anastomosis and ureteral implantation. The first embraces all end-to-end and end-to-side unions of the ureter; the second, transplantation of the ureter and burying of its extremity into the bladder or other hollow viscera of the abdomen. These expressions have been selected on account of their simplicity, which makes them fittingly applicable.

Prior to 1886 I find no record of success in work of this kind. In that year, however, Schopf cut a ureter in removing a cyst of the broad ligament. He made a successful end-to-end union with fine silk sutures, displaying originality and ability in successfully coping with so formidable an accident.

Four years later, 1890, Hochenegg made a resection of the ureter in doing a hysterectomy for cancer, but happily joined the ends. His patient had a fatal hemorrhage on the twentieth day.

In 1891–92 Fritsch followed with a successful case. The next year Kelly mistook the ureter for an enlarged vein, ligated and severed it, but united it end-to-side, after Van Hook's method, thus doing the first successful case in America.

Cushing followed in 1893, but using a deficiency of sutures (three), had leakage. His patient subsequently recovered.

Taufer did two cases, 1893 and 1894. The first was cut in removing an intraligamentous cyst; the second was severed by mistaking a bluish tumefaction for a tumor. He united them end-to-end on a segment of catheter to which a string

was attached for the purpose of removing it before tying the last three sutures.

Emmet (B.) cut the ureter while removing a tumor in the lumbar region, and repaired it by the Van Hook method. This is the highest point at which anastomosis has ever been done.

Doherty did the Van Hook operation in 1895.(?) Robinson (Mayo) had success in splitting the lower segment and invaginating the upper into it.

Bovée, April 20, 1896, cut the ends obliquely and made careful coaptation by close stitching with small sutures. Over these he introduced longer ones to relieve the tension.

July 2, 1898, the writer ligated the ureter with the ovarian vessels and Fallopian tube in a case of large extraperitoneal fibroma This was the very first ligature applied in doing the hysterectomy. The bladder end was split about three-eighths of an inch, as much of the mucous membrane as could be drawn out was cut away; then the upper or kidney end of the ureter was invaginated into it, using a mattress suture for the purpose. The split was then closed with fine sutures, making a snugly fitting cuff around the opposing end, with no mucosa intervening. Small silk was used to stitch the raw edge of the inferior segment around and to the sides of the upper section. A peritoneal cuff was thrown around the joint thus made, and the ureter buried behind the peritoneum. The entire work was conducted with the aid of a ureteral catheter, which had been introduced through the ureter into the bladder and drawn out of the urethra with a pair of forceps. The upper end was passed into the kidney end of the ureter. This served a great purpose, the entire manipulation being greatly facilitated by it. It also prevented obstruction of the ureter by crowding down the cut end of the mucosa just below the line of union. This woman suffered from absorption of pus for a number of weeks from double pyosalpinx, was emaciated and thoroughly septic. Her temperature just before going upon the table was 103°, and had been running equally as high for the time she had been in the hospital,

and perhaps longer. Her pulse was 130 per minute, weak and thready. Thus this anastomosis was done with unfavorable conditions, but with success.

In October, 1898, the writer did a successful resection of the left ureter in a case of extraperitoneal extension of sarcoma of the ovary. About one-and-a-half inches of the duct was removed and ends united as above, the peritoneum being stripped from the entire left half of the pelvis. The bladder was separated from the upper portion of the vagina and the horizontal rami of the pubic bones and drawn up to the left ileo-pectineal line to cover over or bury the ureter, and there fastened with silk sutures. In this instance the ureteral catheter was introduced on the stylet, and being thus stiffened it passed directly out of the urethra from the ureter, thus dispensing with the use of forceps to fish it out of the bladder. Abdominal and vaginal gauze drains were employed; no leakage.

The twelve cases of ureteral anastomosis were ultimately successful. One had leakage, but finally recovered.

Schopf's case lived seven weeks; Hochenegg's died on the twenty-first day, but the autopsies proved both cases to have had successful union of the cut ureters.

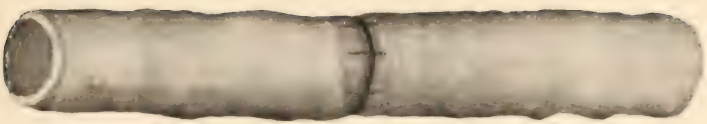
The twelve cases were what I have termed primary operations—that is, the ducts were repaired at the time of the injury. Secondary operations for anastomosis are impracticable on account of shrinkage of the distal end, which naturally follows disuse of that segment; therefore, no operations of this character have been accounted.

Theoretically, Van Hook's operation is the simplest and safest, but it is difficult to execute in a normal ureter. It also requires about a half-inch more in length of the ureter than the end-splitting, as done by Robinson and modified by the writer, or that of oblique union, after Bovée. The only case of leakage reported was one of simple end-to-end or butt union; all the invaginations, whether end-to-end or end-to-side, made perfect recoveries. Any of them may be greatly facilitated by the use of the catheter, as it steadies the delicate

duct, and it gives to this work that which the "hollow keck" of Thomas Bryan or the Murphy button gave to intestinal anastomosis. Invagination is less likely to result in leakage than the end-to-end union, whether transverse or oblique. There seems to be no common method of operating applicable to all cases, the conditions existing in one may so modify its requirements that the method used in it would not apply to another or simpler one; it is, therefore, useless to attempt to draw hard-and-fast rules, but to incline to the general principles to be obtained; thus there are several features necessary to success aside from thorough asepsis. First, perfect coaptation or invagination; this must be done in such a way that no mucous membrane can slip between the two ends of the ureter. Second, the ureteral artery should be preserved in its continuity to the ends of the ureter. Serious injury to this vessel will cause the ureter to perish beyond the point where it ceases to receive its blood-supply. Dr. Kelly reports a fistula following a very careful dissection of some malignant glands off the ureter with catheter introduced, saying he must have cut the ureter. The chances are that in the dissection the ureteral artery was injured, consequently the ureter sloughed, for it is not at all probable that it was injured when so prominent and clearly outlined as it is made by the catheter. The ends of the ureter, therefore, should be cut back to the point where the artery is intact, lest underdiminished blood-supply and tension should cause it to slough. Third, all strain or tension must be relieved. Should union occur by first intention, the parts will separate as soon as the sutures cut out or release them, as will be seen later on. Fourth, there must be no obstruction to the flow of urine.

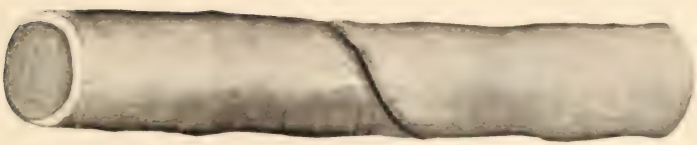
Implantation. There have been seventeen cases of implantation of the ureter into the bladder and one into the pelvis of the kidney. This operation is more recent than that of anastomosis by six years. Baumm did the first in 1892, making the sacro-coccygeal incision. His case had double ureter with congenital fistula. Novaro, in 1893, cut a displaced ureter, but stitched it into the bladder. His

No. 1.



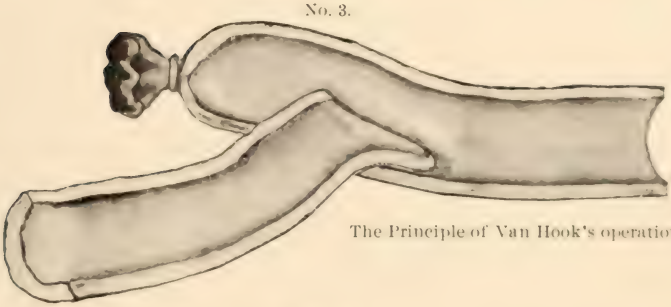
Simple End-to-End or Butt Union.

No. 2.



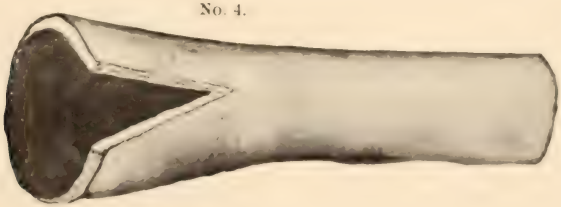
Ends Obliquely Joined After Bovée.

No. 3.



The Principle of Van Hook's operation.

No. 4.



End-splitting and Invagination employed by the writer.

case had leakage, but ultimately recovered. Krug, 1894, did the first American implantation. He cut the ureter in an abdominal hysterectomy for carcinoma uteri. Penrose published in 1894 (private communication says 1893) his case of resection of an inch of the ureter for carcinoma uteri.

Westermark, May 2, 1894, did the sacro-coccygeal operation, resecting the ureter and stitching the same into the bladder. Abbe's case, August, 1894, was not a true implantation. He attempted to remove a foul pouch or abscess, but finding the ureter involved desisted, stitching it to this diverticulum of the bladder. Krouse, in the summer of 1894, did the secondary operation for fistula following vaginal hysterectomy. He used tension sutures, bringing them out of the urethra. Kelly did implantation in October, 1894. Boldt, October 10, 1895, did the secondary operation for fistula, leaving the catheter in the ureter to give it support.

December, 1895, Baldy inadvertently lacerated a ureter in removing a tubo-ovarian mass involving an inflamed and softened broad ligament. He implanted the ureter into the bladder, and releasing the viscus from its attachment to the horizontal rami of the pubic bone, tacked it to the pelvic wall at the ileo-pectineal line (private communication). Polk, January 26, 1896, resected the right ureter in an abdominal hysterectomy for cancer. He made the implantation, but had leakage. His case ultimately recovered, but subsequently died of cancer. He secured the specimen, which showed a contraction of the ureteral outlet and hydro-ureter.

January, 1896, the writer did the implantation for severed ureter. It was included in the ligature of the left ovarian artery. This is the fourth instance in which the ureter was displaced to this extreme point and tied with the ovarian vessels. O. Witzel, spring of 1896, did the secondary operation for fistula, transplanting the ureter extraperitoneal by a more direct or shorter route.

Anna M. Fullerton had a case of double ureter in which both were severed and implanted successfully, March 10, 1897.

Kelly, January 26, 1897, did Fritsch's operation, but failed

on account of supervening pyelonephritis. At another time he endeavored to operate for fistula, and in order to determine which ureter was injured, catheterized, and, finding an obstruction, concluded that that side was injured, but it proved to be a strictured condition instead of a severed ureter, so he cut the wrong one in operating the second time upon the same case, and then had resulting two fistulæ instead of one. Later they were relieved by a vaginal operation.

Fürth, 1897, cut the right ureter in abdominal hysterectomy for large fibroid tumor, but succeeded in implanting it into the bladder. The ureter was hidden in a mass of varicose veins and included in the ligature that secured them.

One other case was mentioned by H. T. Hanks (in discussion), but as it has not been published he could send me no data (private communication).

These have been divided into primary and secondary operations for the purpose of better consideration. In the first class (those that were repaired at the time of the injury) there were nine cases with one failure, and one case of leakage which finally recovered, thus giving an ultimate success of eight cases, or nearly 89 per cent. This one failure was due to tension exerted upon the ureter. The ninth day, when the bladder was allowed to fill with urine and assume its normally globular shape, it pulled away from the ureter and caused leakage. The bladder in this case had been stripped from its attachment to the horizontal rami of the pubic bones and the upper portion of the vagina and anchored to the side of the pelvis. Everything went on well till the day above mentioned, when the removal of the permanent catheter caused this unhappy result. Thus there is some danger of failure in the released or displaced bladder. It is not a safe measure when it does not entirely relieve the tension upon the ureter. In such circumstances prolonged catheterization is needful. These results show a very high percentage of success.

The primary operation is easy of execution, so that if the ureter is long enough for implantation, and yet not cut too low in the pelvis for ureteral anastomosis, implantation should be

the elect of one who has had no experience in the work, though anastomosis gives the best results in skilful hands.

There were eight secondary operations for implantation, resulting in three with leakage; six ultimate recoveries, and two complete failures, giving a percentage of 75 per cent., which is a remarkable showing for this very trying kind of surgery. Two were "partial success," but ultimately recovered. The secondary operation is a much more formidable undertaking. The peri-ureteritis, exudate, scar tissue, and false passages render the work one of exceeding difficulty, as every available centimetre of the ureter must be preserved. Difficult dissection may cause one to desist and cut the tube too short for implantation. The skilful hand of Kelly has had two failures, and he abandoned the operation in two other cases. According to his experience, there is an uncertainty in the reliability of the catheter as a guide, he fearing to use it in the fistulous opening lest infection of the ureter and kidneys result from it. He attempted to make a diagnosis of the ureter involved by searching out a healthy or uninjured one per urethram, but, encountering an obstacle in the ureter about the base of the broad ligament, he concluded that it must be the injured one. Accordingly, the wrong ureter was cut in the operation and engrafted into the bladder, but failed. Perhaps filiform bougies might have prevented this error; or if he had not been satisfied with examining one side, but had also examined the other, he would then have discovered that obstruction existed in both, in which case the filiform might have been called into use for the purpose of differentiation. The urethral catheter, though dangerous, is a valuable aid to diagnosis, and is invaluable in this class of work, but should be used by skilful hands and with strict aseptic precaution, as death has followed its introduction into a fistula.

The details of fixing the ureter into the bladder varied so greatly that it is difficult to make a comparison of the relative merits of each. When tension sutures were used, or the ureter split and stitched to the bladder at the sides of the incision, no

leakage occurred. In cases where the character of sutures are not mentioned, there are three with leakage. Krouse brought threads out of the ureter to prevent the strain from dragging on the bladder, while Boldt let the catheter remain to give the ureter support. So it is difficult to draw a satisfactory conclusion. Perhaps preference should be given to the Van Hook method. Drainage is useless when the work is well done, unless there is some tension upon the ureter, when it will aid in fistula formation and saving the life of the patient in case of failure. It should be gauze freely applied and brought through the vagina. In anastomosis of the ureter high up it should be inserted above the pelvic brim. With drainage there is liability of infecting the sutures, so it should not be placed directly upon them, but in close proximity. It is, however, a misfortune that prompts its use, for if coaptation is good, no strain upon the ureter, and no infection in the wound, it is unnecessary and is liable to encourage failure by permitting infection. It was used in six of the seventeen cases of implantation, and leakage occurred in four of them. In no case where drainage was omitted has leakage occurred. It does not follow that gauze drainage is the cause of all failures, but the percentage is so great it cannot be passed without notice. Upon the other hand, no operator is apt to drain if he feels satisfied with his work. So it is presumed the drainage cases were bad ones.

Stricture of the cut end does occur, as has been shown by Polk's specimen. Cystoscopic examinations have been made in many of these cases, and no tendency to stricture reported. But such examinations are not thoroughly reliable. Doubtless Polk's case would have shown no tendency to stricture if it had been examined by the cystoscope, but when removed from the body the stricture and hydro-ureter were self-evident facts. To prevent this, either splitting the duct or obliquely cutting the end will suffice. Perhaps the latter is better, on account of the tendency of the split to close by granulation. But little harm can come from strictures thus formed unless they are exceedingly tight, for in ordinary conditions the

urine is secreted so slowly that very small apertures will suffice for its escape. While the urine enters the bladder by hydrostatic force as well as by contraction of the ureter, this force may be overcome by complete obstruction temporarily existing in or at the ends of the ureters. Excessive distention of the bladder alone will not suffice to create this condition; it necessitates some adjuvant which is not infrequently found in kinking of the ureter from adhesions or fixation by exudate thrown out in the process of inflammation. When existing, this condition of affairs will fix or hold immobile a section of the ureter, while the lower extremity may be drawn upward, producing an acute angle and obstructing the flow of urine at the point of fixation. Again, hydro-ureter follows compression by malignant growths in the broad ligaments. The writer saw double hydro-ureter produced by obstruction of the patulous ends of the ureters in a case of loss of the base of the bladder (vesico-vaginal fistula). Intra-abdominal pressure crowded the upper portions of the bladder into the fistula, effectually shutting off the escape of urine from the ureter.

With the exception of two instances the ureter was buried extraperitoneally, which no doubt is the safest method. In one case the total operation was extraperitoneal; it failed, however, on account of death from pyelonephritis (Kelly). This method (Fritsch's) is the ideal for the secondary operation of implantation, the only objection being the exposure of the iliac vessels to the danger of an infected wound in case the operator should be unfortunate. In clean wounds it does not appear to add any material risks to strip these vessels of fatty tissue and peritoneum, for several times in removing enormous extraperitoneal tumors I have exposed the external and internal iliac vessels their full length without injury.

In addition to the above there was one implantation into the pelvis of the kidney, the highest point at which ureteral surgery can be done. This case will be recognized as the brilliant resection of a strictured upper extremity of a ureter

by Küster. Though the primary result was not a complete success, on account of leakage, he effected a cure by subsequently closing the fistula.

Of the total number of operations (thirty), including Küster's, there were three failures, or 10 per cent., which is a remarkably good showing in such new work, especially of an organ that a decade ago was considered beyond reach of the surgeon's skill. This estimate is fair, for there can have been but a few operations not reported, unless failure has dampened the ardor of the operators; but silence of this character does not pertain to this operation alone. These figures, so far as statistics go, are as good as any, for the work has been confined to skilful hands and honest men.

Success has nearly banished the practice of nephrectomy in injuries of the ureter, as those of you who advocated it six years ago at Louisville show by your radical change of views. The merits of each case must decide the operation best fitted for its repair. If a primary operation, the point at which the ureter is cut will probably decide it. High injuries preclude implantation and tend to make anastomosis easy; those inflicted at a point very low down or close to the bladder render anastomosis difficult and favor implantation. Between these there is a line of demarkation not well defined that will allow of some latitude of selection, so that the operation easiest to accomplish should be done. When a long section has been removed it renders it either impracticable or the problem a vexed one. Fortunately, such cases must be rare, for the disposition of the proximal ureter then becomes a serious question. Intestinal implantation has its dangers and discomforts. Skin implantation means all the distress of repulsive fistulæ, though it affords ample time for reflection. Switching it across to the opposite ureter is probably practicable only when there is coexisting dilatation or hydro-ureter, as to the forcible introduction of a tube larger than the ampulla, into which it is to go, is liable to obstruct the flow of urine from above the point of anastomosis. This might be overcome by giving the ureter to be transplanted an upward turn and anastomosing it to the

wider portion of its fellow at the pelvis of the kidneys, or into the latter cavity, even if a lumbar incision is required. Implantation into the bladder will be requisite when the ureter is cut low down and in secondary operations for injuries of the inferior extremity of the ureter, for the cut-off portion becomes occluded or shrunken so that anastomosis into it is impracticable.

It will be observed that the consideration of other ureteral operations have been studiously avoided ; many of them teem with brilliancy, such as the removal of foreign bodies and excision of the ureter. Of the first, Hall, of Cincinnati, claims the honor of one of these operations; in the latter Kelly has done brilliant work, being the first to remove the entire ureter in long sections, Reynier having done his by piecemeal. Vaginal operations are too numerous to mention, and do not come within the scope of this paper, the conditions being such that they are not applied to the same class of cases.

A noticeable feature is that with three exceptions each operator had but one case. Tauffer had two. The writer three, with one failure. Kelly published four, with two failures.

No.	Operator.	Date.	Bibliography	Cause.	Primary or secondary.	Incision.	Operation.	Extra- or intra-perit.	Drainage.	Leakage.	Result.	Remarks.
1	Baumm,	1892	Centralbl. für Gynäk., 1892, No. 17, p. 336.	Congenital double ureter fistula.	Primary.	Sacro-coccygeal	Stitched in bladder.	Extra-perit.	None.	None	Success	
2	Navaro,	1892	Ibid., No. 27, 1893.	Vag. hyst.	Secondary.	Abd. into perit.	Stitched to incision in bladder.	Intra-perit.	Gauze, abd.	None.	Partial success final success	Length of bladder incision 1½ centimetres.
3	Krug, F.	Spring, 1894	Amer. Gynec. and Obstet. Journ., N. Y., 1894, pp. 495–497.	Abd. hyst. fibroid displaced ureter.	Primary.	Abd. into perit.	Stitched in bladder; end of ureter split; bladder closed by superimposed layers of sutures.	.....	None.	None.	Success	Length of bladder incision 1½ centimetres.
4	Penrose, C.B. July, 1893	Spring, 1894	Med. News, Phila., April 28, 1894, p. 470.	Abd hyst. carcinoma uteri.	Primary.	Abd. into perit.	Abd. hyst.; resected about an inch of left ureter. Van Hook's method.	.....	None.	None.	Success	
5	Wistermark, F.	May 2, 1894	Centralbl. für Gynäk., 1895, No. 7, vol. xix.	Sacro-coc. cyst; carcinoma uterus and ureter.	Primary.	Sacro-coccygeal	After hyst.; resection ureter; stitched in bladder.	Extra-perit.	Gauze.	None.	Success	
6	Abbe,	Aug. 1894	Ann. Surg., Aug., 1894. p 183.	Lacerated while operating on abscess.	Secondary.	Kraske.	Failed to remove pouch, so anastomosed ureter into it.	Extra-perit.	.....	None.	Success	
7	Krause,	Sum'er, 1894	Centralbl. für Chirur., 1895, No. 9, p. 220.	Vag. hyst. fistula.	Secondary.	Abd. into perit.	Implantation into bladder; tension threads drawn out through urethra.	.....	.....	None.	Success	
8	Kelly,	Oct. 1894	Bull. Johns Hopkins Hospital, Feb., 1895.	Vag. hyst. fistula.	Secondary.	Abd. into perit.	Van Hook. Ureter short; bladder loosened from peritoneal attachments; under surface of ureter split.	Intra-perit.	Gauze.	None.	Success	

9	Boldt,	Oct. 10, 1895	Amer. Journ. Obstet., N.Y., 1896, vol. xxxiii. p. 844.	Vag hyst. fistula.	Second-ary.	Abd. into perit.	Catheter inserted through fistula, ureter dissected and implanted in bladder; catheter *in situ*, and projecting through urethra.	Extra-perit.	.....	None.	Success	Three stitches. Boldt also had long fistulous track from brim pelvis—nephrectomy.
10	Baldy,	Dec. 1895	Amer. Journ. Obstet., 1896, No. 3, vol. xxxiii.	Divided ureter in enucleati'g tubo-ovarian mass in which bd. ligment destroyed by inflam. process.	Prim-ary.	Abd. into perit.	Implantation into bladder; two lateral sutures ureter to bladder; bladder tacked to pelvic wall at ilieo-pectoneal line. (*a*)	Extra-perit.	Glass.	None.	Success	Length of bladder incision 1″. Bladder released from peritoneal attachments. (Private communication).
11	Polk,	Jan. 26, 1896	Amer. Gyn. and Obstet. Journ., Feb. 1892, No. 2.	Abd. hyst. carcinoma uterus and ureter.	Prim-ary.	Abd. into perit.	Resect. r. ureter for 1 in.; implantation.	.....	Gauze.	Leak-age.	Partial success final success	Constriction shown pt.-mort. one year after at bladder insertion.
12	Noble, G. H.	Jan. 1896	Grady Hosp., Atlanta.	Abd. hyst. displaced ureter; ligated with ovarian ends.	Prim-ary.	Abd. into perit.	Implantation by forceps through urethra; 3 inches resected; ureter too short; bladder released; Kelly method.	Extra-perit.	Gauze, abd. & vag.	None.		Ninth day bladder allowed to fill up with urine; ureter pulled out; urinary infect'n; uremia, etc.
13	Witzel, O.	Spring, 1896	Kelly's Gyn.	.....	Second-ary.	Abd. into perit.	Ureter transferred to side of pelvis above ilieo-pectoneal line to shorten rout; end cut oblique; segment of ureter buried in bladder wall.	Extra-perit.	.....	None.	Success	
14	Fullerton, Anna M.	Mar. 10, 1897	Kelly's Gyn. and Amer. Gyn. and Obstet. Journ.	Abd. hyst. fibroid; displaced ureter; double; cut a little below Fallopian tube.	Prim-ary.	Abd. into perit.	Double ureter; both ends implanted into the incision in bladder.	Extra-perit.	.....	None.	Success	Double ureter; both transplanted.

No.	Operator.	Date.	Bibliography	Cause.	Primary or secondary.	Incision.	Operation.	Extra- or intra-perit.	Drainage.	Leakage.	Result.	Remarks.
15	Fürth, R.	1897	Inaug. Diss., Strassburg, Graeupner, 1898. Centralbl. für Gynak., July 16, 1898.	Abd. hyst. cut r. u. on post. surface of large myoma, tumor ligated in bundle of veins.	Primary.	Abd. into perit.	Implantation into bladder.	Extra-perit.	None.	None.	Success	
16	Kelly,	Jan. 26, 1898	Amer. Gyn. and Obstet. Journ., June, 1898, pp. 739, 740.	Fistula.	Secondary.	Inguinal. Fritsch.	Inguinal incision; extra-peritoneal; peritoneum lacerated in two places; pyloneph. ureter split on dorsum; gauze in bladder removed and new drain put in vagina.	Extra-perit.	Gauze, accidently forced thro'gh blad'er	None.	Failure	Pylonephritis.
17	Kelly,	Not given.	Ibid.	Abd hyst. carcinoma; injured ureter and fistula; catheter in ureter.	Secondary.	Abd. into perit.	Attempted to implant ureter, but cut the wrong one on account of stricture or obstruction to catheter; too weak to operate on other ureter.	....	None.	Leakage.	Failure	Having cut the wrong ureter, and that failing, two fistulæ were thus formed; this case was afterward closed by vaginal operation.

Implantation into Pelvis of Kidney.

1	Kuster,	1892	Archiv für klin. Chir., 1892, xliv., Heft 4, p. 850.	Fistula after lumbar nephrotomy; vesicle anuria.	Primary.	Lumbar	Resection of strictured portion of ureter close to pelvis of kidney and implantation of ureters in same.	Extra-perit.	.....	Leak. 4 mos. subsequent op. for fistule.	Success	This is the highest point at which repair of the ureter has ever been done.

No.	Operator.	Date.	Bibliography.	Cause.	Operation.	Primary or secondary.	Extra- or intra-perit.	Incision.	Drainage.	Leakage.	Result.	Remarks.
1	Schopf,	June 2, 1886	Allgemeine Wiener Med. Zietsch., 1886; Centralbl. für Gynäk., No. 39, 1887.	Cut in removing cyst; b. l. displaced ureter.	Ends fastened and united by 8 sutures through all but mucosa.	Primary.	Extra.	Abdominal.	None.	None.	Success	Eight stitches. Died of tuberculosis seven weeks later.
2	Hochenegg.	Feb. 9, 1890	Wiener klin. Wochen., 1893, vi. pp. 740–755, 812, 864.	Cancer of uterus.	Resected left ureter and bladder; ends of ureter sutured end to end; bladder closed; twentieth day hemorrhage.	Primary.	Extra.	Abdominal.	None.	None.	Died 20th dy. hemorrhage.	At autopsy ureter intact, and this case seems to be classed as a success.
3	Fritsch,	1891–1892	Über die gyn. oigischen Operationen des Jahrgangs, 1891–92. Berlin. 1895, 8vo. p. 287.	Operation for tumor of abdomen.	Stitched ends with fine intestinal sutures.	Primary.	Extra.	Abdominal.	.....	None.	Success	
4	Kelly.	May 1, 1892 Aug. 1893	Bull. Johns Hopkins Hosp. 1893, iv. p. 89.	Hysteromyomectomy, mistook ureter for large vein.	Van Hook's anastomosis.	Primary.	Extra.	Abdominal.	Gauze.	None.	Success	
5	Cushing.	1893	Ann. Gynec. and Pediatrics 1893, vi. p. 277.	Intralig. myoma displaced ureter.	Ends united, two silk one catgut suture.	Primary.	.....	Abdominal.	.....	Leak. for two weeks.	Success	Patient well two years later
6	Tauffer,	1893	Pest med. Chir Presse, Budapest. 1893.	Cut intraligamentous cyst.	End to end on segment of catheter No. 8, which was removed before tying last three stitches.	Primary.	.....	Abdominal.	Vagin'l and glass abdom.	None.	Success	
7	Tauffer.	1894	Archiv für Gynäk., 1894, Band xlvi. Heft 3, p. 231.	Extra-perit. tumor, bluish mass mistaken for tumor and and incised.	Operation as above.	Primary.	.....	Abdominal.	Same.	.....	Success	
8	Emmet, B	Nov. 22, 1894	Amer. Journ. of Obst., 1895, xxxi. pp. 449–464.	Cut in removal of tumor in lumbar region	Van Hook method.	Primary.	.....	Lumbar.	None	.....	Success	Highest point at which anastomosis has been done

No.	Operator.	Date.	Bibliography.	Cause.	Operation.	Primary or secondary.	Extra- or intra-perit.	Incision.	Drainage.	Leakage.	Result.	Remarks.
9	Doherty,	1895	Van Hook in Journ. Amer. Med. Assoc., 1895, xxv. 843.	Cut in abdominal section.	Van Hook.	Primary.	.....	Abdominal.	.....	.....	Success	
10	Robson (Mayo),	1896	Internat. Med. Annual, 1896, p. 602.	Extra-peritoneal myoma; removed 2 in. of ureter.	Splitting lower end, invaginating.	Primary.	.....	Abdominal.	.....	.....	Success	
11	Bovée,	Apr. 20, 1896	Reprint Ann. of Surgery, Jan., 1897.	Tubo-ovarian abscess; ureter caught in ligature of ovarian vessels on right.	End cut obliquely and ditch closed with fine silk and tension sutures over these.	Primary.	.....	Abdominal.	.....	.....	Success	
12	Noble, G. H.	July 2, 1898	Grady Hospital	Displaced ureter ligated and cut with ovarian vessels, Fallopian tube right side; very large intralig. fibroid.	End to end; split lower end, pushed down mucosa, and inserted kidney, end stitched over split and made peritoneal cuff; all done on urethral catheter. Patient in extreme condition, having had for weeks high temp. and feeble pulse. At time of operation pulse 160.	Primary.	Extra.	Abdominal.	None.	.....	Success	Multiple fibroid extra-perito. or intra-lig.; emaciated, contin'd high tem.; feeble, rapid pulse; temp. 102° just before oper.; pulse went up during oper. to 160 at time of anastomosis; urethral catheter kept in 12 hours.
13	Noble, G. H.	Oct. 1898	P. J.	Resect. left ureter, sarcoma intralig. of left ovary.	End to end as above. Peritoneum stripped from pelvis to above brim and from sacrum tumor dissected down behind vagina to floor of pelvis and and around outer side and behind rectum and sigmoid; iliac vessels laid bare in operation.	Primary.	.....	Abdominal.	None.	.....	Success	Malignant;

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—I have been very much interested in all the facts brought out in Dr. Noble's paper, but I shall confine my remarks to a few practical points. In the first place, when the ureter is injured in the course of an abdominal operation it almost invariably occupies an intimate relation to the tumor, which may be densely adherent, the ureter being displaced by the tumor. In a small percentage of these cases the kidney is either infected on that side or the function of the kidney is held in abeyance. It is, therefore, very important, when we cut the ureter, to be sure whether we have a pyonephrosis on that side, or whether or not the kidney is acting at all, so that we may not consume much time in doing an operation which would be dangerous or useless. When the ureter is cut in the course of an abdominal operation, if it is cut high up, I believe in uniting the ends directly, if it can be done nicely, or, if it is a dilated ureter, performing lateral implantation as it was first done by Van Hook. The most satisfactory kind of implantation is that which is made into the bladder and closely imitates the normal condition. I call particular attention, in passing, to that operation, inasmuch as it is the most satisfactory. It is also satisfactory to know that its field may be considerably extended beyond what one would think from pure *à priori* reasoning. This diagram (illustrating) roughly represents the superior strait of the pelvis, and the ureter is cut, we will say, at such a point as this (illustrating). That represents its length, and here is the bladder. I found in one case where the lower end of the ureter was pinned down in a mass of scar-tissue and could not be lifted and handled, that I could bring the bladder up to the ureter by dissecting that side of it loose from the cellular tissue with the fingers and pulling it over to the ureter, thus giving it a gibbous form. It held and did not pull loose, and I got 3 cm. of the bladder in that way. Wetzel, of Bonn, has done practically the same thing.

In secondary operations, where the ureter is cut in the course of a vaginal hysterectomy, where we want to implant the ureter so that the leakage may be into the vagina, the best operation,

I think, is to open the abdomen, cut the ureter off at the lowest point, and turn it into the bladder, bearing in mind that one cannot do this soon after the operation if there is much inflammation, because the ureter is pinned down by a periureteritis.

Dr. J. Wesley Bovee, of Washington, D. C.—In the first place, I wish to congratulate Dr. Noble on his success in this line of work. One of the great objections to all methods of ureteral anastomosis, except his own and that of Van Hook, is the subsequent constriction at the seat of operation. The case of Schopf was used as an argument against the method, and, as I believe, improperly. The anastomosis in Schopf's case was done on a tuberculous patient who died on the forty-second day after operation, and we would not expect the same process of healing to take place in such a patient as we would in one in normal health. The advantage of bladder implantation suggested by some for ureteral anastomosis is not well founded. In the first place, ureteral transplantation into the bladder is only applicable to injuries of the lower two inches of the ureter. The case I mentioned yesterday, which I operated on some time ago, was of that kind, where I had deliberately cut out the lower two inches of the ureter because it passed through a cancerous mass in the course of an abdominal hysterectomy for this disease. Above the lower two inches of the ureter we cannot make transplantation without the extra procedures, as described by Drs. Kelly and Van Hook, of bringing the bladder up on the side, or making a flap from the wall of the bladder, converting it into a tunnel, carrying it up to meet the end of the ureter, which is all extra work, rendering the result of the operation unsuccessful. I believe the plan I suggested, and you will excuse my immodesty for referring to it, of oblique anastomosis is fully as good, in that we have a wider field for coaptation of tissue with an opportunity for good suturing. In my case I felt satisfied with it. I used no drainage, and never heard of any trouble afterward, and the woman a month ago had had no difficulty following the operation.

There is a condition sometimes, as Dr. Noble says, in which a considerable portion of the ureter has been removed, unintentionally, perhaps, high up, say, three or four inches above the bladder, where we cannot effect bladder implantation. So much has been removed that it is difficult to bring the ends of the

ureter together. About two years ago I did some experiments on dogs (extra-peritoneal) to see what could be done in such a condition. The dogs I used were not very large; I think the heaviest weighed forty pounds. The ureter is not very long in dogs of that size. I cut out two inches of the ureter, separated the kidney from adhesions, reanchored it sufficiently low to successfully make a complete anastomosis of the ureter. That has not been done yet on the human subject. But I am looking every day to hear of some one who has been placed unfortunately in such a desperate condition as to need some such procedure, rather than doing a nephrectomy, a skin transplantation of the ureter, or intestinal anastomosis, as suggested by Dr. Reed, of Columbus. I am looking for some one who gets in such an unfortunate position, and am anxious to know what the result will be.

Dr. Noble (closing the discussion).—It was my desire to bring out in this paper the point that the method of anastomosis best suited to a given case might depend upon the facility with which the ends of the ureter could be brought together; thus, an end-to-end anastomosis might be done when an end-to-side anastomosis was impracticable. (Here Dr. Noble, with the aid of diagrams and blackboard sketches, touched briefly on methods for performing ureteral anastomosis, pointed out their variations and modifications, and then demonstrated the superiority of his own methods.)

THE RARITY OF OVARIAN CYSTS IN NEGRESSES.

By I. S. Stone, M.D.,
Washington, D. C.

After several years' experience in a hospital for women, where a large number of negresses are annually treated for gynecological diseases, and where cases of uterine myomata are frequent, the writer has noticed the extreme rarity of ovarian neoplasms and, especially, of the multilocular variety.

Inquiry made of my surgical friends, near and remote, has, in the main, confirmed my observation, as the following summary of correspondence will show. Letters were addressed to all the members of the Southern Surgical and Gynecological Association and to several other prominent surgeons elsewhere, whose opinions should add weight to the evidence furnished. A circular-letter was addressed to these gentlemen, inquiring if they had operated for multilocular ovarian cysts in negresses, and if so, to state the exact color of the patient.

Of the large number who replied to my inquiry there was almost universal acquiescence in the position taken by the writer, save from one important medical centre—the city of New Orleans. This will, however, appear in order.

From Dr. Hunter McGuire we have the following: "I have often operated upon mulattoes for multilocular cysts, but rarely in the pure negro."

[Note.—He has never seen prostatic hypertrophy in a pure negro, while it is frequent in the mulatto.]

Dr. J. McFadden Gaston says: "I have not had occasion to operate for an ovarian tumor in the negro race, and my

observation leads me to the conclusion that they are comparatively rare in the negress."

Dr. C. H. Mastin: "I have never met with an ovarian cyst, either multilocular or unilocular, in the negress. Have never seen or heard of a cyst in this race. Possibly the Alabama negro has not evoluted to the cyst-bearing age, and as yet, is not enjoying the full benefit of their white cousins in this pathological particular."

Dr. B. E. Hadra: "Only one operation upon negress for multilocular cyst. She was a cross-breed between Mexican and negro."

Dr. J. T. Wilson, Sherman, Texas: "Have seen three cases—one multilocular cyst, others small." (Real negroes.)

Drs. Rogers and Smythe, Memphis: "Four cases multilocular cyst in jet-black women."

Dr. Paul Eve: "Five cases—one in black, others in copper-colored women."

Dr. Arch. Dixon: "Six cases—all mulattoes."

Dr. J. B. Holmes: "I have never seen an ovarian cyst in a negress."

Dr. Opie: "Can find no case on record in my list of operations of multilocular ovarian cyst in a negress. Have had a number of unilocular cysts."

Dr. Noble, Atlanta: "One multilocular ovarian cyst in dark, nearly black woman. Have heard of another."

Dr. Maury: "I have never seen in a negress an ovarian cystoma, single or multilocular."

Dr. Hardon: "None."

Dr. Long: "One case, seven-eighths negro."

Dr. George Ben Johnston, Drs. Senn, Marcy, Cartledge, Taylor, of Richmond; Polk, Duncan, Eve, Engleman, Tiffany, Souchon, Davis, of Burmingham, and others have no recollection of ever having seen cases."

Dr. Hall, Cincinnati: "One case, a mulatto."

Dr. Vander Veer: "One thousand sections. No case of ovarian tumor in a negress. All fibroids or fibro-cystic."

Dr. C. P. Noble: "Perhaps two or three."

Dr. Porter, Providence, R. I.: "Only one."

Dr. Price: "Have removed a good number of cystomas from black women."

THE NEW ORLEANS EVIDENCE. As previously stated, the information received from surgeons resident in that city is largely at variance with that already produced. Accordingly, we give it special attention.

From Dr. R. Matas: "When a student, saw at least two ovarian cysts in negresses. In reports of Charity Hospital, 1896, I find two simple and one multilocular cysts in negresses, all, presumably, operated upon. I have not looked up the older reports, but am satisfied, and it is the general impression here that ovarian tumors are not considered very rare in the negro race."

Dr. Michinard to Dr. Matas: "I remember having removed at least ten ovarian cysts when I had charge of the colored section of the Gynecological Department of the Charity Hospital. I saw five or six more requiring surgical treatment." (No mention of exact color.)

Dr. Michinard (in person): "I do not remember the purity of race of the colored women in whom the cysts were, nor do I recollect how many of the cysts were multilocular. I am satisfied that the colored woman is as subject to cystic degeneration of the ovaries as the white."

Letter of Dr. Rudolph Matas:

"NEW ORLEANS, November 21, 1897.

"MY DEAR DR. STONE: Here are a few figures taken from the reports of the Charity Hospital that may interest you:

		White.	Colored.
1890.	Ovarian cysts	0	2
1891.	" "	3	3
1892.	" "	5	3
1893.	" "	5	3
1894.	" "	8	9
1895.	" "	16	10
1896.	" "	9	4
	Total in six years	46	34

Total white and colored, 80

"In addition, in six years, 1890 to 1896:

	White.	Colored.
Multiple cysts	0	1
Multilocular cysts	1	2
Dermoid cysts	4	3
Cyst of broad ligament	1	2
Parovarian cyst	0	3
Total	6	11
Total cysts	52	45

"The population of the hospital (all diseases and conditions), was during the ten years, 1886 to 1896: Whites, 45,563; colored, 23,409; total, 68,972.

"This will give you some idea of the prevalence of ovarian cystic disease in both races. Also, when we consider the proportion of colored to white, you will realize that cysts of the ovary of all classes are rather more frequent in the negro than in the white.

"The cysts reported on the records are, I am sure, almost all observed in operated cases. This is confirmed by the fact that the number of cases has increased in the last six years (the period of greatest operative activity) out of all proportion to the increase in the hospital population.

"Very sincerely yours,

"R. MATAS.

"P. S.—I regret that I cannot furnish any positive evidence as to the precise degree of crossing in the 'colored' patients included in the above data. Many are, no doubt, mulattoes; but exactly how many are pure blacks and how many of lighter shades, I cannot tell. You may depend upon it that specimens of both are included in the population from which these figures were obtained.—R. M."

Dr. Fortier says: "From September, 1894, to November, 1896, there were eight cases of ovarian cysts in negresses admitted into the Charity Hospital. Four were operated upon successfully; one was a double cyst. The other were

not operated upon. These eight cases occurred in three thousand admissions to the hospital."

Dr. E. S. Lewis: "Now that you have called my attention to it, I can safely say that multilocular tumors are very much less frequent in the colored than in the white. Have removed a great many ovarian tumors from both white and colored women."

Dr. N. G. Bozeman[1] reports a case of ovarian cyst without attachment in the pelvis, occurring in a negress (not multilocular). Dr. Bozeman's case was unique in his experience. He says in his letter: "I introduced the subject of ovarian cysts in the negro race for discussion in the Jefferson County Medical Society, at Birmingham, last January (1897), and elicited the information that none of the doctors present had seen one in a negress."

In Washington two surgeons have had one case each. Dr. F. S. Williams, of the Freedmen's Hospital, had one of these, 1897, the writer being present at the operation. Several other surgeons were also present and all testified to the extreme rarity of such cases. The woman was dark-copper colored. Dr. J. W. Bovée has had one case in a negress, in which the tumor was undergoing malignant degeneration.

Conclusions. From every source save one we have overwhelming testimony favoring the view assumed by the writer, that ovarian tumors are exceedingly rare in the negro race. From all sources outside the city of New Orleans we can find, by a large correspondence, but fifteen cases where dark-skinned negresses were operated upon for ovarian tumors—multilocular or unilocular. We have the assurance, also, that in fully one-half of these the women were not full-blooded negroes, and finally, in some of these black women the cysts were unilocular.

We make careful distinction between multilocular and unilocular cysts, because there can be no doubt about a diagnosis at time of operation when we find a multilocular cyst. It

[1] American Gynecological and Obstetrical Journal, January, 1897.

is otherwise with cysts of the parovarian, or those of the broad ligament, etc., which are, perhaps, classified as ovarian, and their removal called ovariotomy in hospital reports or operation lists, when, strictly speaking, they are not ovarian tumors.

The writer has frequently operated for dermoid, papillomatous, parovarian, and broad-ligament cysts in negresses (although most of these in "mixed" cases), but has not seen a multilocular ovarian cyst.

Finally, we are inclined to the belief that in the Charity Hospital it will be seen that a large number of mulattoes and cross-breeds will be found to swell the list of ovariotomies in that institution.

DISCUSSION.

Dr. William L. Robinson, of Danville, Va.—I have operated on a number of mulattoes, but I have never seen an ovarian cyst in a negress.

Dr. J. B. Murfree, of Murfreesboro, Tenn.—I am a general practitioner, and have been for a great many years, yet I can call to mind but very few cases of ovarian cysts that I have seen in the negro, more especially in the black negro, and I fully concur in the tenor of the paper read by Dr. Stone. I have seen but few ovarian cysts in negro women and remarkably few in the black negro. I can only recall two cases seen in the black negro, one of the cases I would like, with the indulgence of the Society, to relate: During the month of September, 1896, I was called upon to go to the country to make a post-mortem examination of a colored woman who had recently died. At first I declined to go, but being told that it would be impossible to get her into a coffin unless she was cut up; that her body could not be lifted so as to be prepared for burial; that she had a tumor of twenty years' standing; that it had grown so much that she was as large as a horse, and thinking that there was something in the case of pathological interest I consented.

I immediately telephoned Dr. W. G. Crosthwaite, of Florence, to assist me in the autopsy, which he readily consented to do. Taking Mr. R. W. Vickers, a druggist, with me, I drove out to

the residence of the deceased, where I found Dr. Crosthwaite awaiting me. We entered the room where the subject lay, and to our great surprise she did look more like a dead horse than a dead negro; there was indeed a large lump of inanimate humanity. She lay on her back with her abdomen immensely distended, so much so that from a casual observation little else was to be seen; her limbs were so small in comparison with the tumor that they were scarcely noticeable. With the assistance of four stout men we succeeded in lifting her from the bed to the floor, where the dissection was then made. The history of the case, as we gathered from her friends, was that twenty years ago she had a tumor in her bowels which several doctors told her was an ovarian tumor, and that they could do nothing for her. Four or five years ago Dr. Crosthwaite had examined the tumor and insisted upon her having it removed, which she declined to do. Upon inspection we found an immense distention of the abdomen in every direction; on palpation fluctuation was easily detected. The abdomen measured around the body over the navel six feet and one inch. From the ensiform cartilage to the pubes the measurement was four feet and eleven inches. A trocar was thrust into the tumor below the umbilicus and the fluid streamed out. A second trocar was inserted, and yet we realized that it would take a long time to empty the sac in this way. Whereupon I made an incision an inch in length through the abdominal walls and the fluid gushed out. The fluid was collected as it ran out, but notwithstanding the care exercised a good deal was lost in changing vessels when filled. What fluid was caught was carefully measured, which amounted to the amazing quantity of twenty-five gallons, with two or three gallons lost. Estimating the amount lost at one gallon, we have then in all twenty-six gallons. We had no means of weighing this fluid, nor could we remove it. Estimating a pound to a pint, we have the enormous amount of 208 pounds, which I am satisfied is really less than what the actual weight would have been. She was so large that when she sat down in an ordinary chair her abdomen would touch the floor. After evacuating the tumor we found a thick sac—as thick as chamois-skin; the sac readily peeled off from the external parietes, but was bound by firm adhesions securely and posteriorly, so securely that it could not be removed in its entirety. The abdominal organs, aside from being

slightly displaced backward, were in their natural site and were normal. The uterus was prolapsed, enlarged, and elongated. We did not succeed in finding the ovaries. The subject was about fifty years of age, had never borne children, had always fairly good health, nothing to complain of but the tumor.

It is wonderful to what extent human endurance can go. Think of an averaged-sized woman carrying about with her in her daily walks always 208 pounds in addition to her own weight. And ten days before her death she cleaned up the room and made up her own bed.

Dr. J. Wesley Bovee, of Washington, D. C.—I have operated on ovarian cysts in the colored race, but I do not remember operating on a real black negress for an ovarian tumor. Of course, we find a good many different forms of ovarian cysts, such as come from degeneration or from inflammatory conditions, as, for instance, tubo-ovarian cysts. I recall removing from a colored woman tubo-ovarian cysts that measured fourteen inches in length. They were found in the abdominal cavity. I have removed five or six ovarian tumors in the colored race, but I think in every case the cyst was the result of some inflammatory action or malignant condition. Dermoids are common in the colored race, more so than simple ovarian cysts. I remember operating on one case in 1893 for a large multilocular ovarian cyst, and I had a note put down in the hospital history of the case that it was very suspicious of malignancy. The woman came back at the end of two months, when I saw her, and she had some œdema of the lower extremities. In the meantime the specimen had been sent to the Army Medical Museum, and a report received to the effect that it was not malignant; but the œdema this woman had thoroughly convinced me that my first suspicion was correct, and I made a note of this in the outdoor service-book to that effect. I thought the woman would die soon. Four years later I received a note one morning from one of the anatomists in the Army Medical Museum (Dr. Lamb), saying he had made an autopsy the day before on a woman, giving her name, and that he was told by the attending physician I had operated on her, and that he would like to have a history of the case. I gave him the history, and as the cyst was still in the museum, he re-examined it, and then concluded it was malignant, showing conclusively that it is impossible some-

times for a skilful pathologist to make an accurate diagnosis as to the nature of the growth. At the autopsy he found cancerous masses, as he told me later, involving one ureter, but no trace of cancer down in the pelvis.

Last summer I removed from a colored woman a large broad-ligament cyst which was ovarian. I thought it was malignant, and a microscopical examination verified my opinion. That woman, according to the information received about a month ago, is destined to die in a short time. Nearly all of these cases have some form of malignancy, whether dermoids or inflammatory cysts.

Papillomatous cysts are very common in negro women. Within the last eight months I have operated on two or three cases of papillomatous ovarian cysts. But the true, simple ovarian cysts we are accustomed to meet so much in years past in the white race, and which are now so uncommon practically, are a rarity in the colored race, and if all the statistics could be brought down to a true pathological basis, with microscopical examination, it will be found that very few of them are simple ovarian cysts.

Dr. George A. Baxter, of Chattanooga, Tenn.—I concur in the views of the author of the paper regarding the rarity of ovarian cysts in the negro. I have a distinct remembrance of the first case of ovariotomy I ever performed. The case presented some peculiar features. The operation was done by the old clamp method, as far back as 1876, the ovary and cyst being removed on one side. The other ovary was felt, considered healthy, and left. This woman was a pure-blooded negress, and as black as the ace of spades. A peculiar characteristic was this: She afterward bore a full-blooded negro child after he removal of the ovary and cyst. Less than a year ago I heard she had a second child. I preserved the cyst I removed for a considerable time, but the alcohol finally evaporated, and it was lost. I do not know the exact size of the cyst, but the fluid from it filled two ordinary buckets. I have since operated for the removal of a dermoid cyst in a full-blooded negress. Those are the only two cases I recall. I have noticed this, that fibroid tumors or ovarian cysts in negro women are nearly twice as large as those we see in white women.

Dr. Joseph Taber Johnson, of Washington, D. C.—While my experience in abdominal surgery has been considerable, I have never met with a unilocular cyst in a negro woman. There is one point brought out by the discussion which seems of considerable interest, namely, that when a negro woman does have an ovarian tumor, it is one of considerable size, as in the case reported by Dr. Murfree.

PENETRATING WOUNDS OF THE CHEST.

By J. B. Murfree, M.D.,
Murfreesboro, Tenn.

Penetrating wounds of the chest constitute an important class of injuries, one that we are frequently called upon to treat, and which oftentimes gives us great perplexity and causes grave apprehensions. And they are important not only on account of their frequency, but especially on account of the serious nature of the wound, both as to the extent and character of the tissues and organs involved as well as the great damage done to the individual; alarming in their character, they often render the recipient a cripple and sufferer for life, and not infrequently are rapidly fatal.

The organs within the chest are of vital importance to the individual, and upon their integrity depend very greatly his safety and comfort. They are essential to life; are emphatically vital organs, and any decided and extensive encroachment upon their integrity quickly shuts out the vital flame and ends in death.

While this is true, yet at the same time they are possessed of great and seemingly wonderful resisting and recuperating powers, sustaining great destruction of tissue and yet maintaining their vitality as a whole.

Wounds of the chest may be confined to the walls—*i. e.*, parts external to the thoracic cavity, or they may extend through the walls into the cavity, injuring the tissues and organs enclosed in the pleural sac. Hence, wounds of the chest have, very naturally, been divided into penetrating and non-penetrating.

The non-penetrating wounds of the chest are the same as

wounds of the soft parts in other localities, and deserve no consideration here.

It is the penetrating wounds of the chest to which I invite your consideration, and which I will endeavor to briefly, yet I trust intelligently, present in their full scope and bearing.

A penetrating wound of the chest may be said to be a wound produced usually by external violence, where the walls of the chest are penetrated and the offending substance enters within the thoracic cavity. It is a wound where not only the chest-walls are injured, but also the tissues, and oftentimes some of the viscera within the cavity are injured. It may be defined to be a wound that penetrates through the walls of the chest into the cavity of the thorax, injuring to a greater or lesser extent the contained organs and tissues.

The tissues and organs within the chest may be wounded, or the penetrating substance may simply pass through the wall of the chest and parietal pleura into the cavity, and not wound any of the contained viscera or the enveloping membranes.

Penetrating wounds of the chest vary in their extent, character, and severity; they vary from a small perforation made by the delicate knife blade or small bullet, merely separating the tissues without inflicting any serious injury, up to a fearful laceration with a great loss of tissue and serious damage to an organ, produced by a large knife or a Minie-ball. Penetrating wounds of the chest are caused most usually by external violence or force brought to bear upon the chest-walls at some particular spot by a pointed instrument or substance, most usually a knife blade, a bullet, or some sharp-pointed instrument or substance. Any substance capable of making a punctured wound and dividing the tissues so as to gain an entrance into the pleural cavity is capable of producing a penetrating wound of the chest. Most usually, however, they are produced by cutting instruments which are pointed, or missiles from explosives, constituting the gunshot wound; stabs and gunshot wounds of the chest are those most generally seen.

Penetrating wounds of the chest constitute a dangerous class of wounds, necessarily so from the parts involved. The danger is in proportion to the vitality of the parts injured, the extent of the wound and the character of the substance inflicting the wound.

Wounds of the heart and large bloodvessels are much more dangerous than wounds of the lungs, while wounds of the lungs are much more dangerous than wounds of the pleura and smaller bloodvessels. Yet any wound of the chest that penetrates into the thoracic cavity constitutes a serious wound —a wound that seriously disables the patient, and may produce death.

Wounds penetrating the chest are dangerous from hemorrhage, from the admission of air into the pleural cavity producing a collapse of the lungs, from emphysema, from empyema, from septicæmia, and exhaustion. When a large vessel is injured death quickly ensues from the loss of blood, while injury to a smaller vessel may endanger life and even prove fatal from continued or frequently repeated bleeding. The sudden admission of atmospheric air into the thoracic cavity may produce a collapse of the lungs, and the patient die from suffocation. Empyema may result from the effused blood in the cavity not being absorbed nor organized, but, being contaminated by the streptococcus pyogenes, becomes liquefied and purulent, producing possibly systemic infection by its absorption into the circulation, or else form a sinus of external escape, which by a long and exhaustive drain may wear away the life of the patient.

Emphysema may result from a wound of the lung, the inspired air through the rent in the soft part gains admission into the cellular tissue not only of the chest, but also, it may be, of the greater part of the body, thereby materially interfering with their natural condition and functions. Finally, penetrating wounds of the chest may give rise to a septicæmia from the absorption of septic matter introduced from without or generated inside, which may prove fatal. A wound which penetrates a chest-wall opens up an

avenue for the entrance of air which may be loaded with bacteria.

Most generally in penetrating wounds of the chest there is a free hemorrhage, and blood escapes through the external wound, yet not all of it, as more or less of it is retained in the pleural cavity, which usually is readily absorbed, and no harm results; but occasionally it fails to be taken up by the absorbents, and from contact with the air undergoes decomposition and becomes infectious.

From the injury done to the lung an inflammatory action takes place, producing a pneumonitis. When there is a large external wound the lung may partially protrude, giving rise to a hernia of the lung, which is called a pneumocle. Sometimes, in addition to the wound to the lung, there there may be a fractured rib complicating the injury, and this is not an infrequent accident in gunshot wounds of the chest.

The symptoms of penetrating wounds of the chest come on quickly after the injury is received, but vary greatly in their intensity and duration. Nor are they always in proportion to the gravity of the damage done. Generally the shock is decided; the pulse is rapid, small, and weak; the heart's action is feeble, while the surface of the body is pale, cold, and bathed in perspiration. The respirations are often shallow, jerking, and irregular, and the air is heard passing in and out of the wound with each respiratory act, while blood is forced out with each expiration and cough. Wounds of the chest are readily recognized from the prominence of the part affected, and the especial feature in the diagnosis is to discriminate between wounds which are external to and those that are within the cavity. But usually the symptoms which indicate that a wound has penetrated the chest-wall is distinctive and designative. They are recognized by the locality of the injury: the external wound being situated somewhere on the chest, usually at an intercostal space. There is an escape of blood mingled with the air; the hemorrhage is severe, oftentimes profuse, and there is a ready passage of air to and fro with each respiratory act. When a lung is injured, in

addition to the escape of air at the external wound, there will be a bloody expectoration. Hemorrhage from the lungs and the escape of air through the wound externally are the diagnostic symptoms of injury of the lung tissue. The bleeding may take place into the bronchial tubes and be expectorated as pure blood, or mingled with air, forming a red, frothy sputum, which in time becomes rusty or dark-colored. Or, again, the bleeding may take place into the pleura, forming a hæmothorax, which is gradually taken up by the surrounding tissues. The air escapes through the external wound with each respiratory movement, or it may be retained in the pleura, greatly distending the thorax and compressing the lungs; or, again, it may enter into the cellular tissue, constituting an emphysema. When there is a large external opening the air rushes in and out with each respiratory act. The shock attending a wound of the lung is very great. Usually there is a great depression, with much anxiety and distress. There is a dryness and irritation of the throat which produces a constant desire to cough, only restrained by the severe pain occasioned by any movement. When a penetrating wound of the chest injures the heart or a large bloodvessel, there is a decided shock with great distress, depressed circulation, tending to a gradual failure of the heart's action. There is usually a sharp pain, with great difficulty of breathing, and often death quickly ensues.

The diagnosis of a penetrating wound of the chest is made by duly considering the seat of the injury, the instrument which inflicted the wound, and the general condition of the patient. The escape of air with the blood indicates that at least the pleura has been wounded; the expectoration of blood that the lung has been injured; while a severe shock with a profuse hemorrhage and collapse indicates that the heart or one of the large bloodvessels has been wounded. Penetrating wounds of the chest necessarily injure the soft tissues, both external and internal, and the great vascularity of these tissues causes more or less hemorrhage; usually these wounds bleed quite freely, sometimes profusely. From the anatomical

formation of the chest it is almost impossible after a wound for all of the blood to escape from the pleural cavity, consequently there is some blood retained, either to be absorbed or undergo decomposition.

This retained blood is usually readily absorbed, leaving no bad consequences behind. Sometimes it is organized into lymph-bands, which bind the walls of the pleura together, and thus materially interferes with respiration. Occasionally it liquefies and is converted into pus, which produces the most disastrous results. In either event time is required for their accomplishment. As a rule, we find that penetrating wounds of the chest are slow in healing, and convalescence is protracted. While penetrating wounds of the chest are always serious yet, as a rule, the prognosis is favorable for recovery. Sometimes such great injury is done to the heart or great bloodvessels that death is inevitable, yet they nearly all are subject to such treatment as will prove successful oftentimes in preserving the life of the individual.

The treatment of penetrating wounds of the chest differ but little from the treatment of wounds in other parts of the body.

The general rules of surgery should govern the treatment here as well as wounds elsewhere. The principles of treatment of penetrating wounds of the chest are to arrest hemorrhage, relieve shock, remove all foreign substances from the wound, thoroughly cleanse the wound and adjacent tissues, hermetically seal the wound of entrance and exit under a rigid asepsis, and, finally, to immobilize the chest-walls. For the purpose of arresting hemorrhage the ligature (the best of all hæmostatics) should be applied whenever it is practical to do so. The internal mammary and the intercostal arteries can be ligated. When the bleeding vessels cannot be reached, compression must be used.

As a rule of practice, we may rely upon nature to check the hemorrhage by coagulum where there is no external bleeding, but where there is an external bleeding, we must not hesitate to enlarge the opening and ligate or compress the wounded vessel or vessels.

Aseptic gauze must be tightly packed in the wound so as to compress the bleeding vessels. In order to get at the bleeding vessels so as to apply the ligature or compress, we should enlarge the wound, and if necessary resect one or more ribs so as to gain a free access to the bleeding point. The whole of the pleural cavity may be filled with gauze, if need be, to arrest the hemorrhage.

If the hemorrhage is primary we can arrest the bleeding by plugging the wound with aseptic gauze; but if secondary we should not hesitate to cut down upon the wound, remove one or more ribs, find the bleeding vessel and ligate it. The patient must avoid all excitement; perfect quietude must be secured. Cold applications should be made to and around the wound, while the chest is tightly drawn by a firm bandage.

Internal remedies (excepting opium) are of but little value; gallic acid, sulphuric acid, acetate of lead, and especially ergot, are prescribed, but are of no benefit, or but little.

The wound must be closed, the patient lie upon the injured side, and kept perfectly quiet, in order that as the heart's action becomes more feeble the effused blood may coagulate and close the mouth of the bleeding vessels.

The shock is best treated by stimulants, anodynes and external artificial heat. Nitroglycerin, strychnine, brandy, ether, and digitaline should be given hypodermatically. In extreme collapse from shock and hemorrhage I have seen a prompt and steady reaction follow the injection of the normal saline solution. But in the effort to bring about reaction great care must be had lest we get up too much stimulation, which would cause the wound to bleed afresh.

All foreign substances must be carefully removed from the wound, but in doing so the injured parts must be disturbed as little as possible for fear of causing bleeding or infecting the wound. Under no circumstances should the wound be probed except with the finger, first rendered aseptic.

The wound and surrounding surfaces must be thoroughly cleansed and made aseptic by the use of antiseptics, if need

be; then the wound closely brought together by deep and superficial catgut sutures, so completely approximating the edges as to prevent the admission of air. Over the wound must be applied an aseptic dressing, and the movement of the chest-wall must be prevented by firmly applying a firm bandage, preferably a plaster-of-Paris jacket.

The patient should be put to bed with the shoulders and chest slightly elevated, and the utmost quietude enjoined, and especially should the patient be forbidden to talk.

The diet should be liquid, nutritious, but non-stimulating. To relieve pain and quiet restlessness, morphine hypodermatically should be given.

After two days a brisk cathartic should be administered. The room should be well ventilated and thoroughly cleansed, for it is absolutely necessary that the patient should breathe pure air, free from any micro-organisms. In an infected atmosphere where pyogenic germs are carried into a wounded lung by respiration, patients seemingly get well only to succumb after weeks or, perhaps, months to pulmonary inflammation, the result of infection through the respired air.

While penetrating wounds of the chest are in their very nature serious and dangerous, sometimes producing frightful damage to the thoracic viscera and tissues, yet it is gratifying to see so many recoveries the result of an intelligent, bold, and persistent treatment.

DISCUSSION.

Dr. Louis McLane Tiffany, of Baltimore, Md.—Very little is left to be said in regard to the diagnosis and treatment of penetrating wounds of the chest, because the essayist has covered the ground so well. There is one point, however, which Dr. Murfree did not mention, namely, that it is wise to get a piece of lung into the wound and tie it in case of hemorrhage, thus producing an artificial hernia.

There is one more subject which we are to hear about to-day in regard to operations upon the ribs and pleural cavity by Dr.

Parham. You will pardon this digression. We need to be taught a great deal with reference to opening the chest. The profound collapse which comes on when the surgeon opens the chest cavity is what happens when large penetrating wounds take place, and I shall be glad to hear what Dr. Parham will have to say about that when he reads his paper, because personally I know nothing about it.

I agree with Dr. Murfree that the blood already in the chest will take care of itself. If it becomes purulent, a hole can be made in the chest-wall and a tube inserted.

Dr. George A. Baxter, of Chattanooga, Tenn.—There is one class of penetrating wounds of the chest which requires our individual judgment and a slightly different character of treatment. I refer to those wounds which make a valvular opening in the chest-wall. I have seen one such case where the ball entered the chest-wall, struck the rib, and passed on, making a long valvular canal as long as my index-finger. The air was shut off completely from the lung, and it struck me it would be meddlesome to interfere surgically with this condition of affairs, if we consider the small danger from hemorrhage and the modicum of danger from sepsis. In such cases I think I would follow strict injunctions about probing and treat the wound as one of simple character until there were some developments in the way of inflammatory action and pus accumulation, then make surgical interference a secondary consideration.

Dr. Murfree (closing the discussion).—I have no additional remarks to make in conclusion, except to thank Dr. Tiffany for his suggestion of tying or anchoring a piece of lung in the wound, and thus making a tampon for the purpose of arresting hemorrhage. I have no doubt this would control a profuse hemorrhage, where we have evidence that it comes from the lung; but if the hemorrhage is not from the lung-tissue we must rely upon a ligation of the vessel or packing the cavity.

THE USE OF ANTISTREPTOCOCCIC SERUM IN CASES OF PUERPERAL SEPTICÆMIA, SEPTIC CELLULITIS, POST-OPERATIVE SEPSIS, AND ERYSIPELAS.

By W. L. Robinson, M.D.,
Danville, Va.

In submitting this clinical report, I do so the more unhesitatingly since I realize the unfavorable conditions which the surgeon has to deal with when called to such cases. I would not detract one jot from the meed of praise due to the expert who, in the face of death, snatches the victim from its very jaws when he does hysterectomy for puerperal septicæmia, but he must be a bold man indeed who would use the knife before trying other means, and when these have been fairly tested, the poison has too often invaded tissues beyond surgical reach, in fact so saturated the system that small hope rests even with the skilled surgeon, and none to the inexperienced or non-operative class, that vast army of practitioners who minister to the great majority thus afflicted.

We have the staphylococcus, bacillus coli commune, and other germs as causative agents in puerperal septicæmia; but the streptococcus pyogenes in the great majority of cases is the microbe doing the deadly work. Primarily the disease is local, indicating local treatment; but the surrounding tissues and lymphatics soon become involved beyond the uterus and adnexa, then the blood teems with the poisonous microbes, requiring an agent to combat the toxins and stay the organic degenerations. Here the prompt administration of antistreptococcic serum seems to meet the indications. No constitutional disturbances follow its use. In commanding doses

repeated every eight, twelve, or twenty-four hours, as the urgency requires, you may expect decided reduction of temperature, a corresponding improvement in pulse, expression, and general condition.

In the failures reported in journals, I think they may fairly be attributed either to the delayed use of the serum, inadequate dose, or the existing of other microbes as the causative agent in the case.

I do not wish to undervalue the microscope, but the large majority of practitioners either have no microscope, or are unskilled in its use, or too remote from an expert to waste valuable time. Of course, when available exclude doubt by its use, but use the serum first and the microscope later. Nor would I leave undone any of the auxiliaries in the management of these cases: the irrigations of the uterus, search after abrasions and sealing the same. Purgatives, stimulants, normal saline injections, and massage, etc., should be intelligently prosecuted.

Puerperal Cases.

Case I.—Mrs. S., thirty-seven years old; multipara; had an easy delivery, with uneventful history until the sixth day, when she ate very imprudently, got up, had two chills, followed by high fever, was freely purged, irrigated and examined for abrasions; none found; temperature marked 104°, and kept up for two days; the lochia became fetid, but no local tenderness; insomnia distressing in spite of anodynes. On the the third day of the fever, 10 c.c. of antistreptococcic serum was injected at 8 P.M. Temperature was 100° at 7 A.M., but rose to 103° in the afternoon, when 10 c.c. of serum was again injected, with prompt abatement of fever, which did not rise above 100.5° again, and rapidly recovered.

Case II.—Mrs. N. R., twenty years of age; primipara; excessively fat; delivered with forceps on November 25, 1897; lacerated perineum; repaired at once; stitches removed on the seventh day; union perfect. On December 13th kept awake by constant crying of baby; had a chill in the night,

and when I saw her at noon of the following day, one mammary gland was inflamed greatly. Freely purged, saline injections, and local application to the gland. Fever remained at 104¾°; lochia became fetid on second day of fever. Breast well on third day, but nothing controlled the fever until on the evening of the third day 10 c.c. of antistreptococcic serum was injected, and by morning the temperature was normal, but for three evenings the temperature would go up, but promptly dissipated in six or eight hours by the serum, and after the fourth injection no rise of temperature recurred. The characteristic breath, rapid pulse, sweating, chilliness, nausea, and tympany marked the case as septic.

CASE III.—E. C. (colored), aged nineteen years; delivery May 30th; chill on June 3d; lochia muddy and offensive, but profuse. Irrigation twice daily; loose gauze drainage; touched abrasions in the cervix with iodine and carbolic acid; used saline solution hypodermatically, stimulants, etc., for two days, then administered the serum four days in succession with little improvement until the last dose, when symptoms manifested marked change. I never saw such constant chilliness, continued high fever (105° to 106°), pulse 130 from June 3d until 8th. Septic diarrhœa, constant nausea, and insomnia. Recovery slow, but uneventful. I think that sapræmia existed in this case, but am also disposed to think the streptococcic infection prevailed, else the antistreptococcic serum would not have benefited the case.

CASE IV.—Mrs. B., daughter of a doctor; primipara, aged twenty-one years; delivered on August 19th. I saw her on the 23d; very large and fleshy; badly lacerated cervix and perineum; temperature, 104°; pulse, 148; tenderness in pelvis; fetid lochia, etc. Had been purged, beside having taken 36 grains of phenacetin, 20 grains of quinine, and 24 grains of Dover's powders in the twenty-four hours just preceding my arrival. Irrigated, sealed laceration, and used saline solution submammary. No improvement therefrom by following morning, I obtained consent to use serum; 10 c.c. injected, but with slight effect until the second dose. I did not see her

again, but sent three more bottles, which were used in four days. The uterus was not irrigated again after my visit, because the patient rebelled. Her father wrote: "I shall ever be thankful to you; the serum worked like a charm and saved my child's life."

CASE V.—Mrs. M., primipara, aged twenty-three years, weight 170 pounds; delivered on September 20th; badly lacerated perineum; promptly repaired; stitches removed on the sixth day; union good; chill on the 23d; temperature, 103°; pulse, 110; headache, nausea, pelvic tenderness, scanty lochia; irrigation thrice daily; drainage, stimulants, submammary, saline solution, etc. No abatement by the 25th; commenced with serum; in eight hours temperature was normal. A rise occurred in the evening for three days, which was promptly brought to normal by the serum in from six to eight hours; recovery uneventful.

CASE VI. (Dr. J. A. Anderson's Case I.)—Mrs. R., aged twenty-nine years, multipara; confined September 15th; on third day chill, followed by temperature of 105°; lochia checked, no odor; tenderness over the abdomen; rapid, weak pulse; no appetite; no improvement. In twelve hours serum was used, with disappearance of all bad symptoms twelve hours after; recovery uneventful.

CASE VII. (Dr. J. A. Anderson's Case II.)—Mrs. B., aged thirty-eight years; multipara; easy confinement June 5th. Nothing unusual until the 10th, when she complained of chilliness, headache, and weakness; some tenderness over womb; lochia scant, fetid odor; temperature, 102°. Constitutional and local treatment carried out as usual until June 22d, when was prostrated by a chill, lasting an hour, followed by rise of temperature to 106-5°; unconscious and comatose for several hours Serum at 4 P.M., which wonderfully improved the patient. In twelve hours second dose given; and a third in twenty-four hours later, with rapid recovery. Regarded the patient hopeless when the first dose of serum was administered.

Post-operative Cases.

CASE I.—Hattie L. (colored), entered the hospital with cancer of uterus; aged forty years. Operation and healing of abdominal incision uneventful, except she had fever preceding operation, from septic absorption. Ten days after operation temperature rose to 103.5° every evening, with diarrhœa, nausea, and chilliness, sweating, rapid, weak pulse. Nothing controlled either diarrhœa or abated the symptoms until, after weeks of diligent effort, I used 10 c.c. of antistreptococcic serum, repeating it in twelve and thirty-six hours. Result, prompt abatement of the fever with return of appetite, subsidence of diarrhœa in four days, and rapid convalescence.

CASE II.—Mrs. W., aged fifty-six years; cancer uteri. Hysterectomy on March 17th. Developed small fistula on the seventh day; healed in ten days. Seemed well for two weeks, then complained of constant pain in right lumbar region, with constant fever, rapid, weak pulse, nausea, insomnia, chilliness, and diarrhœa. Medicine failed to relieve, and on the seventh day of fever gave 10 c.c. of antistreptococcic serum, with disappearance of fever in twelve hours. Three doses in twenty-four-hour intervals secured complete convalescence.

Post-operative Peritonitis.

CASE I.—Mrs. M., entered the hospital June 5th; pus-tubes and ovaries removed on the 7th. On 10th slight rise of fever, which increased daily in spite of saline infusions, sponging, etc. The chilliness, pulse, nausea, insomnia, continued diarrhœa, tympany, etc., for days stamped the case as septic. On the 15th injected 10 c.c. of serum, with prompt fall of temperature, and two additional injections in twenty-four and forty-eight hours dissipated the unfavorable symptoms, and rapid convalescence followed.

CASE II. (Dr. Anderson's case.)—Mrs. W., aged thirty-one years. History of former miscarriage and septic fever, lacerated cervix. Muco-purulent discharge from uterus. First seen by Dr. Anderson, April 7th, suffering severe pain

in the left iliac region, which had been increasing several days. General condition fair, slight fever, tenderness and pain gradually extended over the whole abdomen, requiring large opiates to obtain any relief or sleep, until finally breathing was painful, almost unbearable. On the 8th, at the suggestion of Dr. W. L. Robinson, the antistreptococcic serum was used, with the result that pain ceased, temperature subsided, and she slept without opiates. Improvement continued for about ten days, when distressing symptoms returned (pain and fever). On the 16th and 19th the serum was injected again, with permanent relief. After this Dr. Robinson operated for pus-tubes, and found adhesion extensive, strong all over intestines; recovery complete.

Septic Cellulitis.

CASE I.—Mr. T., aged thirty-eight years. Saw him March 2, 1898. Injury of right thumb by rusty nail ten days previously, the whole thumb suppurating and commencing necrosis of first phalanx. Free incisions, curetting, and antiseptic dressings twice daily failed to control the fever or extension to deeper tissues of the hand, the septic fever prostrating him, robbing him of appetite and sleep. April 1st injected 10 c.c. antistreptococcic serum, with relief of general symptoms and manifest effect locally. In two days Mr. T. called at drug-store and bought another bottle, saying the first did him so much good he wished more used. I used four more bottles of serum with beautiful results, saving the hand complete except first phalanx. The involvement of deep tissues had extended through the whole palm of the hand and half the back of the hand.

CASE II.—W. J. (colored), aged forty-eight years. Injured by spur of a rooster; had been under treatment of Dr. W. for six weeks; whole hand suppurating; first finger gone. Two bottles of serum stopped the progress, and recovery was rapid and complete.

CASE III. (Dr. Pritchett's case.)—Mr. W., aged about forty years. Seen October 18th, 7.30 P.M.; gunshot wound

of ankle, two weeks' standing; outer malleolus shot away; removed many fragments; opened abscesses fully, and treated antiseptically, also tonic suppurating treatment. Temperature, 105°; pulse, 130; general condition bad. October 19th, 3 P.M., temperature 103°; pulse, 120; general condition wretched; injected one bottle of antistreptococcic serum, resulting in drop of temperature to 99°, pulse to 100 in twelve hours. Twenty-four hours later temperature 100°, and so remained for one week. Satisfied the disease was extending along the tibia, brought the patient to the hospital, where Dr. Robinson operated at the knee-joint. Osteomyelitis involved both bones up to the joint. For two days all seemed well, then the soft part of the stump became involved, abscessing, and from November 7th to 17th the temperature ranged from 99° to 101°; pulse, 80 to 105, with good appetite, general improvement, then shot up to 104°, pulse to 125. At 5 P.M. injected serum; twenty-four hours later, temperature, 101.5°; gave another injection, which reduced the temperature to 99° in twelve hours, and has continued so since.

Erysipelas.

CASE I.—Miss B., aged fourteen years. Saw her 9 P.M., February 21, 1898. Abscess of lower jaw, extending down the neck and discharging at two points. Cause, extraction of tooth. Erysipelas had extended half-over head, face, and nose. Line distinctly marked, shining, red surface; temperature 104¼°; pulse, 140; delirium, constant nausea and diarrhœa. Injected one bottle of antistreptococcic serum at 8 A.M. following day; temperature, 99¾°; pulse, 120; general condition wonderfully improved; no extension of the swelling. The attack was cut short without further use of the serum, and rapidly recovered.

CASE II. (Dr. Pritchett.)—E. H., child; seen October 9th. Erysipelas of right leg and thigh; much swollen; shining red; also had acute nephritis, with marked puffiness of his eye and face. Urine loaded with albumin; temperature 103¼°; pulse 140. Treatment: tonic, stimulants, and alka-

line diuretics. October 10th, no improvement; with advice of Dr. Robinson used one-half bottle of antistreptococcic serum; next day temperature 100°; pulse 120; redness and swelling of limb disappearing rapidly; general condition much improved; used remainder of the bottle of serum; brought temperature to normal, and rapid recovery.

You will note this, gentlemen, that with the exception of three cases in the puerperal class the attacks came on within three days following delivery. Such a history points strongly to the streptococcus as the cause of the septicæmia. When there is development with profuse discharge you may suspect sapræmia. Still there is often a mixed infection, and you need not hesitate to use the antistreptococcus serum for both the possible benefit and the diagnostic advantage. The results in the puerperal cases are strongly suggestive.

The post-operative are no less striking in their response to the serum.

The septic cellulitis cases and the gunshot wound demonstrated the value sufficiently positive to encourage further trial.

The erysipelas cases were too positive to be questioned.

I grant you, gentlemen, from a strict scientific stand-point the report may have little significance to microscopic investigation, but to the great body of busy practitioners, whose souls are deeply stirred by these perplexing cases and who have no microscopical advantages or conveniences, the antistreptococcic serum will be most gladly welcomed.

Touching the doubt of all things without microscopic proof, I would say that it appears criminal to bar the profession from the use of a remedy pregnant with such possibilities of relief.

DISCUSSION.

Dr. I. S. Stone, of Washington, D. C.—Mr. President: In order to start the discussion I must say that I am startled at the results which Dr. Robinson has described to-day from the use of antistreptococcic serum. In fact, I do not remember having heard a report of cases of erysipelas treated successfully by the serum. This is the first I have heard. I wish Dr. Robinson had given us the untoward results following the use of the serum, because one can hardly believe that it is possible for a man to have such an uninterrupted series of successful results with a new remedy. If he has not had any untoward results from the serum, he must expect them before very long, because there are some cases of puerperal sepsis which cannot be cured by the serum. I do not want him to flatter himself, or to flatter us, so as to make us think he has found something which is going to be a specific. I am saying this in all courtesy and kindness to Dr. Robinson, and I am sure nothing would delight the members of this Association more than to have his results verified in every city and locality in this country. He has given us a remarkable paper, and personally I congratulate him on his successful results.

So far as Washington is concerned, many of you know that Dr. Fry has written upon this subject. He has solicited the views and opinions of various surgeons and obstetricians all over the country as to their experience in regard to the use of antistreptococcic serum. Dr. Moran, of the Columbia Hospital, is working up this subject, and not more than two weeks ago we had a striking result in a case where cultures showed a pure growth of streptococcus. I may say right here, that so far as we have learned from the experience of others in cases where the microscope has demonstrated the presence of pure streptococcic poisoning, favorable results have been obtained by the use of this serum. It is also fair to state that in many cases of mixed infection the serum has not had the expected beneficial effect. If any of the other members have had experience with the use of the serum, I hope they will give us the benefit of it.

Dr. F. W. Parham, of New Orleans, La.—I will merely refer to one case in my own family. One of my children was attacked with erysipelas of the forehead, which progressed steadily down

one side of the face, involving the nose, and then affecting the other side. Finally, the disease spread all over the body, with the exception of a small area. The child was sick two months. I procured some of the antistreptococcic serum from Paris, gave the child two and a half bottles of it. In the first dose I gave one bottle; second dose, one bottle, and the third dose, about half a bottle, because I had lost some of it. The serum produced absolutely no favorable effect of any sort on the disease; in fact, the erysipelas progressed steadily, going over the point of puncture, so that I was unfavorably impressed with it. This is only one case, but it was undoubtedly a case of erysipelas, as a number of my professional brethren in New Orleans saw the patient. The serum was absolutely sterile, and perfectly harmless, but ineffective.

Dr. J. Wesley Bovee, of Washington, D. C.—I do not feel that antistreptococcic serum has yet shown the utility in the treatment of septicæmia that we have expected of it. Certainly, in my experience, it has proved unsatisfactory. We must first know what we have to deal with before we use the serum. A bacteriological examination is required; we must be certain we are dealing with the streptococcus. The serum is of no consequence whatever in any other form of sepsis. In the mixed infections by the streptococcus and staphylococcus, we see practically no good results from the use of the serum.

Another point is the necessity for using large doses. When we find a suitable case the dosage of a good serum should be increased until we see, perhaps, some bad results from it. The dosage should be increased as long as the patient will tolerate it. Cases have been reported in which the results have been satisfactory. Dr. Norris, of Philadelphia, who was infected in an operation, and was in great danger of death as a result of the infection, was treated very liberally with antistreptococcic serum, and he says his life was saved by it. There are other cases where nothing else was found but the streptococcus upon bacteriological examination, in which large doses of the serum have been used, and yet the results have been unsatisfactory. The serum is only applicable in early cases. If we take a case of streptococcic infection late, when the vitality of the patient is greatly sapped, and possibly there are accumulations of pus in various regions,

the serum will not be sufficient, although it may have been early in the case. The patient will probably go on and die unless the pus can be evacuated and other unfortunate circumstances that come in to interfere with recovery are removed.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—I have been very much interested in Dr. Robinson's paper. I have heard and read of cases cured by antistreptococcic serum that were even more startling than those reported by him. There is one very important point that we should not lose sight of in discussing this subject, and that is, of the many preparations of serum on the market, nine out of ten are valueless, and we can arrive at no conclusions from their use.

In regard to a man having the courage of his convictions as to what to do, I wish to refer briefly to tetanus. The treatment with the serum shows that the best results are obtained by injections of it directly into the brain. A surgeon in Philadelphia treated a case of tetanus successfully not long since in this way. In this particular case, however, the surgeon was satisfied with the preparation, he had the courage of his convictions, used the serum, and got good results. It is said, too, that a gentleman in charge of the Pasteur Institute in New York was called to Philadelphia to see a similar case. He injected antitoxin into the brain and cured his patient. But in general surgery we ought not to charge unsuccessful results to this or that thing or to failure of the preparation unless we know exactly what the preparation is. There are, perhaps, fifty-odd firms that are making preparations of serum and putting them on the market. Those who have studied this subject know that the preparations are influenced by temperature; these preparations are sent by pharmaceutical firms all over the country, and physicians do not know whether they have been kept a week, a month, or two months before use. I do not think it is quite fair, therefore, to charge all unsatisfactory results to the remedy.

I believe in the next decade that carcinoma will be treated with preparations of this kind rather than by the knife, and that we will get much better results than we do now from operating. Many errors occur from the fact that statistics are not checked on both sides—I mean checked so far as the diagnosis is concerned, as well as the remedy used.

Dr. Robinson (closing the discussion).—In reply to Dr. Stone, I did not suggest the antistreptococcic serum as a panacea. I have simply submitted the results of its use as I have observed them in the cases described. Whether my diagnoses were faulty or not, I do not know. But I think every member of the Association will bear me out in one statement, namely, that when a man has been practising medicine for a long time, and is an intelligent observer, he is not often deceived when he has a case of septicæmia to deal with. Septicæmia is usually sufficiently marked for any man to make the diagnosis. I stated positively that the serum was of no use except for streptococcus infection.

Dr. Stone asked why I did not report my untoward results. I reported exactly what has occurred in the last thirteen months under my observation, and nothing else.

I have submitted the serum to you for trial because I have obtained eminently satisfactory results with it. If I am not mistaken, with the use of good serum, in twelve months some of you will report results equally as good as mine.

THORACIC RESECTION FOR TUMORS GROWING FROM THE BONY WALL OF THE CHEST.

By F. W. Parham, M. D.,
New Orleans, La.

"All experience is an arch wherethro'
Gleams that untravelled world, whose margin fades
Forever and forever when I move."—Ulysses.

In the spring of 1897 I operated in the Charity Hospital upon a young colored woman for a sarcoma of the thoracic wall requiring the resection of several inches of the third, fourth, and fifth ribs. It was impossible to separate the tumor from the pleura without tearing the latter; a rent of five inches was made, which permitted easily the thrusting of the whole hand into the pleural cavity. Suddenly was presented to our anxious view one of the most startling clinical pictures that the surgeon can ever be called upon to witness. At such a sight the stoutest heart will quaver. No wonder the older surgeons discountenanced such operations, and in the times when there was neither anæsthetic nor asepsis the surgeon might well be excused for indorsing the condemnation uttered by Dieffenbach against Milton Antony for his temerity in venturing to remove a tumor of the chest-wall with a large piece of the lung. This Dieffenbach pronounced the greatest error in this field of surgery, and he added that "the like operations go too much counter to all physiology and give to the beautiful saving art the appearance of cruel annihilation-mechanics."

So sudden in my case was the pneumothorax and so striking

were the manifestations of profound shock, threatening almost instant dissolution before our eyes, that I resolved to acquaint myself more thoroughly with the dangers of thoracic surgery and to study the resources of our art for successfully dealing with such emergencies as are born with the sudden, accidental, or intentional, opening of the pleural cavity.

Soon after that my friend, Dr. Matas, chairman of the Surgical Section of the Louisiana State Medical Society, selected for his address the subject of thoracic surgery, and I agreed to open the discussion. Dr. Matas at once took up, with his usual vigor and thoroughness, the investigation of the whole field of chest surgery. His work, soon to be published, presents in a most interesting and thorough manner a review of the astounding progress made in the past twenty years in this important branch, and clearly indicates its glowing possibilities in the coming decades.

The result of his labors lies before me. I shall strive in this paper not to trench too much upon his ground, but shall rather try to provide the complement to his work, in so far as it relates to but one phase of thoracic surgery, as indicated in the title of this paper.

Since the meeting of the State Medical Society, in May, 1898, when the discussion on chest-surgery took place, I have had another case, similar to the one above referred to; but, although both happily recovered, the almost insignificant disturbances during and after the operation in the last case were in such striking contrast with the stormy manifestations of my first operative attack that I cannot forbear here to express my deep gratitude to Fell and O'Dwyer, whose labors in the fields of intubation and forced respiration enabled me in the second case to overcome the dangers of the first. I would not willingly discredit in any degree the original investigations of Tuffier and Hallion and of Quénu and Longuet, nor would I speak disparagingly of Doyen's mechanical ingenuity as displayed in his independently devised apparatus for artificial respiration; but it is only just to say that credit belongs to Dr. Fell, of Buffalo, for giving to surgery an

apparatus embodying in its practical evolution the principles so ardently urged by Fell and O'Dwyer. As far as I can learn, I am the first to demonstrate the value of this admirable apparatus (used in my second case) in maintaining the respiration during operations of this kind.

It is my purpose in this paper to present all the cases of resection for malignant tumor of the thoracic skeleton that I have been able to find in medical literature.

My work has been much facilitated by the chapter on this subject in Paget's entertaining work on the *Surgery of the Chest*, 1896; by Quénu and Longuet's article "Des Tumeurs du Squelette Thoracique," in the *Revue de Chirurgie*, May 10, 1898; by the paper of Gerulanos on "Operative Pneumothorax," in the *Deutsch. Zeitschr. f. Chir.*, for October, 1898. To these I am especially indebted, but in most cases I have consulted the original bibliographic references, and have thus been enabled to correct some errors in reports of cases, to throw out some erroneously included, and to add others not found in any of the collections of cases accessible to me.

I regret very much that in the preparation of this paper I was unable to find in the Surgeon General's Library at Washington, Campe's *Göttingen-Dissertation*, 1894, "Ueber Tumoren der Knochernen Thoraxwand," in which he has collected fifty-seven cases, of which forty were costal and seventeen sternal. I particularly regret my failure to see his list, because I should have been able to get fuller accounts of some, especially Kœnig's interesting cases. I have, however, succeeded in obtaining many of his data from Paget's work, where Campe's thesis is properly credited.

Other references not found in connection with cases reported will be found at the end of this paper.

Tumors of the ribs and sternum may be conveniently divided into:

Primary, including fibroma, chondroma, sarcoma, and their combinations.

Secondary, including sarcomas and carcinomas.

Quénu and Longuet have tabulated their cases in two classes

—the extrapleural or non-penetrating, and the intrapleural or penetrating. They have further arranged them under fibromata, enchondromata, and sarcomata, excluding altogether the carcinomata.

I have adopted the division into extrapleural and intrapleural operations, but have not attempted separate grouping of the histological forms, and have included carcinomas, believing these should enter into a determination of the operative results, and should no more be excluded from such a list than many of the malignant sarcomas.

These cases are arranged by years, so as to exhibit the movement in surgical progress to better advantage.

The operative attack must be so much modified, according as to whether the pleura is involved or not, that I shall consider the cases in two distinct series.

Series I. Cases in which the pleura was not opened.

Series II. Cases in which the pleura was opened either deliberately or accidentally.

Series I. Cases in which the Pleural Cavity was not Opened.

Case I.

Case of Osias Aimar, 1778, osteosarcoma. This case is erroneously made to appear as two cases in Quénu and Longuet's table. No case can be properly credited to Lazarius Riverius, as none is to be found in his works except that communicated to him by Osias Aimar. It appears as the second case in observation No. 491 in the list of 513 observations or histories in the *Four Books of Lazarius Riverius*, translated by Nicholas Culpepper, London, 1678, p. 315. The case is as follows:

"M. de Beffin, captain of a band of soldiers, had for a long time a scirrhous or hard, senseless tumor in his left side upon the true ribs, viz., the fifth, sixth, and seventh. A certain surgeon opened the tumor with an actual cautery, out of

which there came very little matter, and there remained very grievous pains in the part; which compelled him, living in the country, to come to Grenoble and implore my help. I found the ulcer as big as the palm of one's hand and the ribs underneath infected more than half their length with rottenness. Premising, therefore, universal medicaments, I cut off the extremities of the ribs the quantity of four fingers' breadth, applying afterward an actual cautery to their extremities. Finally with catagmatical powders I procured a separation of the burned parts, and with detergent and incarnating medicines I did heal up the ulcer and bring it to a scar."

This case is probably correctly classified by Quénu and Longuet as one of osteosarcoma, but the description does not justify one in saying that it may not have been tuberculous disease of the ribs or carcinoma. The case is, however, retained.

Case II.

Case of Cittadini, 1820, osteosarcoma (*Annali Universali de medicina*, Milano, 1826, xxxvii., 404).

F. L., male (age not stated), farm laborer, had suffered for many years with a tumor, which was now fungous in character and situated in the cartilages of the sixth and seventh true ribs and in the first false rib an inch from xiphoid appendix. Its base did not exceed two inches in circumference.

The operation was done in February, 1820, by Cittadini.

A piece of skin around the fungus was removed, three inches in diameter, and the muscular fibres, belonging partly to the rectus, partly to the great abdominal oblique, loosened by blunt dissection; and the fungus mass was removed together with the cartilages and rib involved. Hemorrhage was arrested by fire. It would appear from the account that a fungous growth was left behind, but it is nevertheless stated that, when the man died two years afterward, the fungous growth had not reappeared.

The healing was slow, but was finally completed after four months.

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Case III.

Warren's case, 1837, osteochondroma (*Boston Medical and Surgical Journal*, 1837, vol. xvi. p. 128).

The patient was formerly a shoemaker, aged forty years, but at present is a trader. He came to Boston in the spring of 1836 to consult Dr. Warren for a hard tumor on the cartilages of the left ribs. His case was this: Two years before, while holding a shoe, on which he was at work, against the breast, the shoe slipped under the pressure and struck him on the cartilage of the sixth rib. The following day he perceived a slight swelling on the spot. This gradually increased, and was about three inches in length when he was first examined. An operation was advised, to which he assented; but having some business to transact he returned home, and did not appear again until about the commencement of the present month, when he entered the hospital for the purpose of submitting himself to an operation. The size of the tumor during this period had greatly increased. Beginning at the upper edge of the cartilage of the fifth rib, it extended to the lower edge of that of the eighth, being about five inches in length from above downward, and four in a transverse direction, from the median line to the left. In color the skin was not changed, excepting that it exhibited numerous enlarged veins. In consistence it had the firmness of a periosteal tumor —that is, something less than a bony hardness. A degree of sensibility existed on the edge of the cartilage of the fifth rib and at some other points. It was slightly movable in a lateral direction, but not in the vertical, and its movement did not appear to affect the ribs. There was a sensible pulsation in it without vibration. The patient wished to know whether an operation for his relief could be safely performed. The skin over the tumor was adherent.

The first question was, What is the nature of this tumor? To the eye it had the appearance of an osteosarcoma; to the touch it wanted the osseous plates of that disease. Was it a disease of the perichondrium? Might it not be a projection

caused by internal aneurism? Did it lie on the outside of the ribs, or might it not extend inward as well as outward? There was an obvious dip of the tumor below the edges of the cartilages into the epigastrium.

Dr. Warren seemed to think that it was either a scirrhous or perichondrial disease—lying under the externus oblique and rectus muscles, and over the cartilages of the ribs, whence it descended into the epigastric region and came in contact with the external face of the internal oblique. As, however, it might extend through the thickness of the cartilages, it would be necessary to consider the possibility of taking out these cartilages. It appeared to be practicable, after cutting through the externus oblique and transversalis to the cartillage, even to separate the diaphragm to the extent of an inch in the direction upward, and then, without opening the peritoneum, pericardium, or pleura, to cut through and remove the cartilages if diseased.

A meeting being held of the consulting surgeons of the hospital, it was decided that it was proper to perform the operation, and proceed in as far as the patient's safety would permit. The operation was performed on March 9th in the following manner: The patient being placed on a table, an incision seven inches in length was made from the fourth rib downward, and the anterior face of the tumor exposed by dissecting away the integuments with the externus oblique and rectus muscles, so far as these were not incorporated in the tumor. Its face being exposed, presented a bluish color, and was of a scirrhous hardness. Every stroke of the knife was followed by a copious flow of blood. When the circumference of the tumor was uncovered its edges were found to be quite undefined and concealed by the muscles above mentioned. These being cut through, an ill-defined edge was discovered, and the dissection was continued along the ribs, from which it was perceived that the tumor could be detached, although strongly adherent. When the dissection was carried as far as the edge of the ribs the tumor was found to turn down over the cartilages into the epigastic region, to involve

the internal oblique and transversalis muscles, and to adhere to the peritoneum for the space of about an inch. From this it was dissected up, and the whole tumor removed in a mass. The latter part of the operation was much obscured by the quantity of blood which was given out by the arteries on all sides. Four large arteries and some smaller ones required ligatures. The patient suffered much when the tumor was raised, from its drawing the peritoneum outward. This part of the operation, however, was short, and as soon as it was terminated he ceased to suffer severely. The wound was closed, leaving an outlet for the sanguineous oozing (sixth and seventh ribs were resected).

On examination of the tumor it presented a cartilaginous hardness. Its surface on all sides was composed of the muscles between which it lay. Its substance consisted of a brownish texture, in which a multitude of granulations, the sixteenth of an inch in size, presented. At one point there was a softening, as if suppuration was about to commence. At another a discolored spot was seen. The internal or epigastric part was equally hard with the rest of the tumor. The surfaces of the cartilages were deeply depressed where the tumor had lain.

The patient since the operation has had a smart fever, and some appearances of peritoneal inflammation, which was relieved by two or three bleedings. From this he is now convalescent.

(Recurrence took place, but I can find no details.)

Case IV.

Second case of J. C. Warren, 1837, osteosarcoma (*Boston Medical and Surgical Journal*, 1837, vol. xvi. pp. 203, 204).

The patient was a stout, healthy person, a surveyor, aged thirty years, from Upper Canada. Six years since, and without any previous injury that he was aware of, a small, hard tumor appeared over the angle of the ninth or tenth rib. From that time to the present it has gradually increased in

size—having, however, daily, less of that bony hardness which characterized it at first.

It was of a circular form, about six inches in diameter, and having an elevation above the ribs of between two and three inches. Its situation was on the lower part of the chest, covering a portion of the seventh, eight, ninth, and tenth ribs —to all of which it appeared attached, but more firmly to the ninth, which was most affected by its movements. The skin covering the tumor was perfectly natural, both in color and consistence, and the patient complained of no inconvenience or suffering from the disease.

The operation was performed on March 27, 1837, in the following manner: The patient was placed on a table a little inclined to the right, with a pillow under the chest, so as to cause a projection of the left side of the thorax.

The operation was commenced by a longitudinal incision, about five inches in length, directly over the tumor. This was joined by another transverse incision at right angles with its central part—the two incisions being well represented by the letter T. The flap thus formed being dissected up, the insertions of the external oblique were exposed and dissected off, not without some difficulty, however, on account of its strong contractions. The latissimus dorsi was now discovered passing over the outer edge of the tumor, and the same, in fact more, trouble was experienced in dividing this muscle than the preceding; the dissection of it was excessively painful to the patient, and was followed by some hemorrhage. The tumor being at length perfectly exposed, was found to originate from the ninth rib, but was strongly adherent to the seventh, eighth, and ninth. A knife was now carefully insinuated under the tumor and its adhesions to the ribs dissected off, great care being taken not to cut through the intercostal muscle and penetrate the chest. As the attachment of the tumor to the ninth rib was not by its whole base, it was thought that more of the rib might be saved by first detaching the tumor and afterward cutting out the rib than by removing both tumor and rib together. It was, therefore,

cut off from the rib at about an inch distance from its cartilage, and the morbid origin of the tumor exposed.

The intercostals were now cut through, the diaphragm carefully separated from the rib and pleura, and a director passed under at the points where the rib was to be divided. The bone was next cut through with the cutting forceps, and about two inches of it in length removed with a portion of its cartilage. The diaphragm immediately rose up, forming a hernia between the ribs. The hemorrhage was not great, most of it being from the divided muscles. No artery bled sufficiently to require being secured by ligature. The wound was brought together by sutures and adhesive plasters. The patient was very little exhausted by the operation. A considerable degree of febrile excitement followed, requiring the employment of copious bleeding.

The wound was united nearly throughout by first intention, and the patient is rapidly gaining strength without the occurrence of any bad symptoms.

In this case, unlike the preceding, very little thickening of the parts lying under the ribs had taken place. This rendered the difficulty much greater in separating the pleura and diaphragm from their adhesions to the ribs, which, however, was finally accomplished without penetrating the chest. (Quénu and Longuet mention resection of the sixth, seventh, eighth, ninth, and tenth ribs.)

Both of these operations sufficiently demonstrate that the excision of the ribs, with sufficient precaution, may be practised with comparative safety.

Case V.

Case of Paget, 1853, chondroma (Paget's *Surgical Pathology*).

(Case No. 21 in Schläpfer von Speicher's list.) A man, age not given. The tumor was a pure enchondroma, formed of hyaline cartilage. It was removed, but recurred, and death resulted. The second tumor was mixed in structure, probably medullary sarcoma.

Case VI.

Case of Gibson, 1853, chondroma. No. 26 in Schläpfer von Speicher's list. This was a boy, aged six years. The tumor seems to have developed as the result of a blow. The ribs and spinous apophyses were involved. The tumor was extirpated, but the boy died six years afterward from recurrence.

Case VII.

Case of Foucher, 1859, chondroma (*Monit. d. sc. med. et pharm.*, Paris, 1859, vii., 126, 133. Schläpfer von Speicher's No. 15).

Man, aged thirty-five years (peasant). Right side, region of the breast. Five years ago he noticed a tumor the size of a hazel-nut. Stationary four years. Six months ago grew rapidly, with severe lancinating pains. On admission into the hospital it was the size of a large hen's egg. Skin normal, not adherent at any place. Very hard, not uniform, bossed; in shape a flattened ovoid. Axillary glands not affected.

Operation, November 13, 1859: Oval, circumscribing incision. Sprang from perichondrium of the fifth rib. Chill next day. Death two days later from purulent pleurisy. Autopsy showed right pleural cavity filled with purulent secretion.

Broca examined the tumor microscopically. Thought it mostly formed of cartilaginous tissue, having undergone some alterations, *but not cancerous*. Enchondroma not well understood clinically in those days, especially in those regions. Velpeau does not mention, in his *Traité des Mal. de Sein.*, enchondroma. The diagnosis should lie between scirrhus and enchondroma.

Case VIII.

Case of Virchow, 1863, chondroma. Case No. 9 in the list of Schläpfer von Speicher. (See also Virchow's *Lehre v. den. Gesch.*, 1863, Band i.)

The patient was an old man, age not mentioned. It is not

stated where the tumor was situated nor on which side. It appeared to come from the ribs, but really came from the intercostal spaces. The tumor could not be completely removed; it was only cut off to the level of the thorax. The wound healed, notwithstanding an attack of erysipelas and pleural metastasis, which invaded also the daiphragm and lungs. The tumor was cartilaginous in structure, but had undergone ossification in parts.

Case IX.

Case of Hueter and Langenbeck, 1865, sarco-chondroma. Taken from No. 4 in Schläpfer von Speicher's list. (See also *Archiv für klin. Chir.*, 1866.)

H. L., aged thirty-three years, letter-carrier. Tumor to the right side of the vertebral column. Admitted to the surgical clinic, Berlin, December 9, 1846. One year before a small tumor was discovered on the back, near the tenth rib. He had been struck by a heavy package falling from a post-wagon. The tumor grew slowly at first, without any severe pain. Later severe stretching and drawing pains came on, and the tumor began to grow more rapidly.

Examination. The tumor was found to be the size of a child's head, sharply limited, extending from the posterior inferior angle of the scapula downward to the lower edge of the ribs. The skin was movable, and could be picked up from the tumor. It could not be determined whether the pleura and peritoneum were involved. The matter was fully laid before the patient, the dangers and uncertainties of the operation being fully explained. He insisted upon the operation, so Langenbeck did it.

Operation: A half-circular skin-flap was taken up and the latissimus dorsi was partially cut. Very great difficulty in freeing the parts of the tumor. The tenth and eleventh ribs were lost in the mass; these were cut in front and behind with Liston's scissors, and the tumor was removed after separation of the soft parts. An area of peritoneum, four inches square, was exposed. Three ligatures were used. The wound

was closed by fourteen sutures. The flap had contracted so much during the operation that it was now just sufficient to cover the defect. For several days there was frequent pulse, but otherwise the condition was good. On the third day some stitches were cut to let out secretions that were distending the wound. The wound was irrigated with permanganate of potassium solution.

On December 23d there was a small sloughing of the flap, the other portion being united, so that erysipelas, which occurred later in the flap, extending upward to the neck, did not disturb the wound in its healing to any extent. Three weeks after the operation the patient left his bed, and on February 1, 1865, after complete healing of the wound, he was allowed to go home.

A letter to Hueter, nine months later from the patient, showed that no recurrence was visible up to that time.

Examination of the tumor macroscopically and microscopically showed enchondroma with probable sarcoma.

Case X.

Case of F. Busch, 1869, osteosarcoma (Langenbeck's *Archiv f. klin. Chir.*, 1872, xiii. p. 49).

Bertha M., aged twenty years. Had a tumor the size of an infant's head under the angle of the scapula. It was not adherent to the skin, and slightly movable against the ribs. It had been growing about six months. The steps of the operation are not described, but it is stated that the tumor had destroyed the ribs and had affected the pleura. There were also metastases in the lungs.

The patient died of shock. The operation was unfinished.

Case XI.

Case of Thiersch, 1871, chondroma. No. 24 in the list of Schläpfer von Speicher.

The patient, a man, age not stated. The tumor was situated on the right side in front, starting from the second and third ribs. The tumor was not completely removed, and

mortification of the intrathoracic portion took place. There was a cavity the size of an egg communicating with the exterior by an orifice the size of a dollar. It was an enchondroma.

Case XII.

Case of Billroth, 1871, chondroma. Case No. 5 in the list of Schläpfer von Speicher (*Deutsch. Zeitsch. f. Chir.*, 1881).

Man, aged thirty-six years. Always healthy formerly; he had remarked since January, 1870, a painless tumor on the ribs, immediately under the right clavicle. No cause assignable. It grew steadily, and had reached on October 20th a vertical measurement of five inches and a transverse of four inches, reaching from under the edge of the clavicle to the third rib, and from the right sternal edge to beyond the mammary line. Skin unchanged. Tumor hard and firm, immovably fixed on the ribs and covered by the pectoral muscle. Tolerably sharply limited, and without pulsation. Aneurism excluded as well as mediastinal tumor.

Diagnosis: Chondroma or sarcoma of the ribs. It was evident from its rate of growth that it must soon end the life of the patient by either growing externally and breaking down or internally, producing compression of the lung and great vessels or internal metastasis. On the other hand, it was clear that the extirpation of the tumor was dangerous because of the difficulty of avoiding opening of the pleural sac, or because radical operation might demand it. Billroth's sections in such cases had shown, not thickening of the pleura, as with periostitis of the ribs, but thinning. It was desirable, therefore, to set up preliminary adhesive pleuritis to prevent pneumothorax. One of the assistants suggested the use of a number of needles passed through the lung in the neighborhood of the tumor, but against this Prof. Billroth expressed the fear that owing to the movement of the lung the needles might give rise to abscesses. It was decided, then, first to remove the tumor only to the level of the ribs, in the hope that the traumatic inflammation would cause peripheral

adhesion or that it could be brought about by cauterization later on.

October 27th. Incision five inches long across the tumor; after dissection the tumor was cut away with a resection knife. It proved to be a colloidal chondroma, made up of many smaller masses, in places calcified. The sharp spoon was then used. On the third day the temperature rose to 40°, tumor sloughing. An opening into the cavity was demonstrated with a soft catheter. The wound of perforation had enlarged, but the patient's condition had distinctly improved. Pleural cavity washed every two hours with warm water and five to five hundred permanganate solution. The wound became as large as a two-thaler piece, and through this a distinct view of the cavity could be had. With each expiration the lung came well through the wound; in inspiration it fell back.

November 9th, erysipelas.

The percussion now showed important changes, dulness reaching to the sixth rib on November 10th. On account of the increasing embarrassment of breathing, Prof. Billroth used the Dieulafoy apparatus, and drew 1400 c.c. of yellowish-brown fluid. The local and general condition thereupon improved, but this only for a few days, as on November 14th another aspiration had to be done (1300 c.c.), on account of the filling of the chest. The improvement was again immediate, but only temporary, as the patient soon became unconscious, and died November 20th. The history of the patient seems to show that the result was brought about by erysipelas and the pleurisy consequent upon it. The autopsy showed both lungs containing air. There were no other tumor-masses on the ribs visible; in the anterior mediastinum, however, were some nodules of colloidal cartilage.

Case XIII.

Case of Kappeler, 1878, sarco-chondroma myxomatosum. Schläpfer von Speicher's case No. 1 (*Deutsch. Zeitsch. f. Chir.*, 1881).

S. S., female, aged fifty-one years. Field laborer, unmarried, was admitted April 5, 1878, into the hospital. About twenty-five years ago she observed at the upper part of the right breast a hard swelling, the size of a hen's egg. It gave no pain, and did not prevent her from working. She mentioned no preceding injury. No family history of tumors. Three years ago there was in the same breast a painful tumor, which disappeared under poultices, leaving the original swelling. Last summer and fall, while working, she had felt at times pain in this breast, which disappeared with warmer weather. In the last four weeks she thinks the swelling has rapidly increased. In the region of the right mamma there is found a tumor the size of a child's head, which extends outward into the axilla, upward to three fingers' breadth of the clavicle, forward to within a hand's breadth of the sternum; below it hangs over, projecting three fingers' breadth above the arch of the ribs. Its lower limit is in the region of the sixth rib. The tumor shows above a round, not sharply limited, swelling, of firmer consistence than the rest of the tumor. No swelling of cervical or axillary glands. Skin over tumor is movable, and can be picked up. In the underpart of the tumor is found a 10 cm. long opening, which was made outside the hospital, giving exit to three litres of a dark brown, odorless, colored substance, and a number of spongy pieces of bone, the smallest of which was 12 mm. long and 8 mm. wide, the largest 24 mm. long and 20 mm. wide. From this opening there issued a foul, brown-colored fluid. The temperature was elevated, pulse very frequent—120 to 134. The appearance of the patient is not cachectic.

Operation, April 6th, under ether by Dr. Kappeler.

A very long incision, convex below, was carried across the wall of the tumor. The tumor was easily shelled out above, externally and internally, adhering, however, firmly over a large surface to the fourth rib. Here great difficulties were encountered in loosening up the tumor. After extirpation of the cyst-wall the fourth rib lay quite exposed and raw for a

distance of 10 cm. This was, with hollow chisel and sharp spoon, so cut away that finally there remained only a rudiment, 4 mm. thick, which was removed with the small saw. The finger could now be thrust into the cavity, where above, as well as toward the sternum, other tumor masses could be felt. These presented themselves as small sacs, filled with thick, colloid substance, and were removed in turn, after incision, with finger and sharp spoon. After scraping out a large sac which extended behind the sternum it seemed that the right auricle could be felt directly under the finger, while behind the rhythmical movements of the lung were felt and seen. The bleeding was considerable, checked by ligature, acupressure, and Paquelin cautery. The great gap was for the greater part covered with skin. Drainage. Lister dressing.

Duration of operation one hour. Narcosis good. After the operation great paleness of face, small pulse, and great weakness.

Though the dressing was frequently changed, complete asepsis was not attained. The temperature, however, for eight days only was ever up to 38.5°, and after this was normal. A part of the edge of the wound sloughed, and some small pieces of bone came away.

19*th*. The carbolic dressing was discontinued on account of subacute carbolism.

23*d*. Out of bed.

June 2*d*. Nearly healed. Patient discharged.

July 9*th*. Back in hospital. Over the fifth rib and under the skin the tumor was the size of a small apple; also a small tumor in the cicatrix, superficially degenerated. Complains of cough, stabbing and boring pains in the chest. Poor appetite, little sleep, general condition not good. Evening temperature elevated.

13*th*. Extirpation of the recurrences. Resection of 10 cm. of fifth rib with upper tumor. It was now seen that the tumor had grown well into the chest cavity. Toward the median line it reached nearly to the middle of the sternum onto the pericardium; posteriorly it pushed the right lung against the

vertebral column, and, when with the finger and sharp spoon the neoplasm was as far as possible removed, the gray-blue lung was seen to form the posterior limit of a tumor cavity, which was projected as large as a man's fist into the chest cavity. The bleeding was considerable, and hard to check owing to the tearing out of the ligatures in the tissue. Cavity filled with gauze and skin sutured. Strict Listerian dressing. She did badly for a time, and there seemed to be a communication between wound and lung, as she said she felt the washing-fluid go into the lung, and she coughed violently.

20*th*. Air-bubbles escaped from wound. After this she improved, and by August 1st there seemed to be no lung communication.

August 17*th*. Recurrence in the form of a round, bluish-colored swelling.

26*th*. Rapid progress of the growth.

September 1*st*. Resected. Small nodules scattered over the wound.

6*th*. Chloride of zinc application.

From now on icterus developed and increased. Bile continued, however, to pass by stool, and was absent from urine; liver and spleen enlarged. Other growths show in the wound. More zinc chloride.

23*d*. Temperature 40°. Liver-line down to umbilicus.

25*th*. Lung communication again. No albumin nor bile in urine.

October 8*th*. For nearly two weeks temperature not above 38°. Continued use of chloride of zinc had little effect since the growth enlarged. She became more dyspnœic, and died November 16th in collapse.

Autopsy showed right lung infiltrated with little tumors, the large arterial branches being also filled with these tumor masses. Similar masses in left lung.

The tumor was an enchondroma myxomatosum. Prof. Roth, of Basel, who examined the tumor, thought the original tumor was undoubtedly an enchondroma, and more likely so from the fact that the metastases in the lungs represented

distinct enchondroma-emboli. The original tumor and the recurrences all showed similar structure—enchondroma with myxomatous combination. Haab, of Zürich, found in periphery undoubted smooth muscle fibres, and although he did not have the advantage of examining fresh tumor, as did Prof. Roth, still his examination seemed to justify him in saying that "the tissue character of the tumor was to be defined briefly as fibrosarcoma cartilagineum."

"Following Lücke," says Schläpfer, "the fibro-cartilaginous enchondroma is also clinically of interest because it furnishes the intermediate stage of sarcoma."

At all events, the tumor in question is a pregnant illustration that enchondroma is not an absolutely benign tumor, and evidences distinctly the capacity for forming metamorphoses and combinations, recurrences, and metastases. In order to include both ideas, may I not, says he, propose the name for the tumor described of sarco-enchondroma myxomatosum?

Case XIV.

Case of König, 1882, myxosarcoma. From Paget's *Surgery of the Chest*, 1896, p. 178. See also Campe's *Thesis*.

This case, reported by Paget in his *Surgery of the Chest*, was operated on by König in 1882. The patient was a female, aged thirteen years. The growth had been noted after rheumatic fever a few weeks before the operation; was thought to be an abscess, and was punctured. General health was very feeble. The growth, about the size of a fist, was situated on the left side, far back over the eighth to the eleventh ribs. There was dulness on percussion, and loss of breath-sounds for about a hand's breadth all around it. The heart was not displaced. It was a round-celled myxosarcoma.

The operation showed extensive malignant disease, which was only scraped away so far as possible. There was rapid increase of the disease, and death three weeks after the operation. At the autopsy there were signs of septic absorption. There was a mass of disease in the pleural cavity the size of a man's head.

Case XV.

Zwicke's first case, 1882, osteosarcoma, *Charité Annalen*, 1882 (1884).

Case of a woman, aged thirty-four years. Tumor of the left side above the breast, globular in shape, of the size of the palm of the hand. It began growing when she was eighteen years of age, growing very slowly until a few months before the operation, when it became painful. The skin over the tumor was reddened.

Operation: Incision through the skin and pectoral muscle discovered a soft, friable, vascular tumor, reaching from the second to the fourth intercostal spaces. As the tumor grew into the thorax, only the lower portion was removed. Notwithstanding this, it is stated in the report that the wound healed with mild suppuration, and that the patient, examined later, was entirely well, no recurrence having taken place. This does not agree with the account of Quénu and Longuet, who state that pleural adhesions were recognized and that the operation remained unfinished. They give the same reference.

Case XVI.

Zwicke's second case, 1884, osteosarcoma, *Charité Annalen*, 1884 (1886).

This was a tailor's wife, aged thirty-two years (Quénu and Longuet give the case as that of a man). The tumor was of the size of a goose-egg, situated on the right side above the costal border. It had been growing four months. It was immovable.

Operation: This is not fully described, but it is stated that the tumor was loosely attached to the tenth rib, and the surface of the ribs in the neighborhood was rough. The diseased tissue was scraped away with a sharp curette until healthy bone was reached. The tumor consisted of granulation tissue and enormous giant-cells. The result is not given.

Case XVII.

Helferich's second case, 1885, alveolar sarcoma. From Hermann Plitt's *Inaug. Diss.*, Berlin, 1890.

This was a male teacher, aged twenty-seven years. He was accustomed to lifting frequently the school benches. He suffered from scrofula since quite a child. While lifting benches two years previously he began to have pains in the chest. After awhile he noticed a swelling in the mammary line under the left nipple, about the size of a cherry. When seen by Helferich, in 1885, the tumor was of the size of a fist. It was a firm, nodular growth, attached to the fifth, sixth, and seventh ribs. There was no lymphatic involvement. The tumor was removed with resection of the sixth rib, the pleura not being opened, although adherent at one point. Curetting was also done and the wound was drained. There was recurrence eight months afterward in the form of two small nodules. I can find no account of the operation to remove these growths. The tumor was alveolar sarcoma. Plitt says "left side," but Paget credits it incorrectly to the "right" side. (Paget, *Surgery of the Chest*, p. 176.)

Case XVIII.

Case of Riesmayer, 1886, osteosarcoma (*St. Louis Courier of Medicine*, 1886, xv. p. 513).

Miss B., aged nineteen years, born in Germany, noticed a year ago a small tumor on the right side over the sixth rib, growing gradually larger and becoming very painful. The tumor, excised twice, returned. On December 26, 1885, the patient came to the Polyclinic, when a smooth tumor the size of a hen's egg, bluish-red color, not ulcerating, was noticed a little outside of the axillary line, connected with the sixth rib. Skin immovable over tumor.

Diagnosis: Osteosarcoma. Tumor excised. Tissues at some places removed down to pleura, and bone curetted. Wound left open, dressed with styptic cotton, and later with iodoform. The day after the operation patient complained

of incontinence of urine and constriction around the abdomen, and was unable to move her legs; sensibility in lower extremities diminished. The paraplegia may be explained either by a myelitis or the formation of metastases. Died a few days later.

Case XIX.

Case of Polaillon, 1889, sarcoma or chondroma? From his work *Affections Chir. du Tronc*, Paris, 1896, p. 203; obs. 104.

B. (Eugene), aged forty years, brickmaker, was sent to me at La Pitié, December 23, 1889. Following a contusion he had observed forming on the anterior extremity of the tenth rib, right side, at the level of its articulation with the cartilage, a tumor, which had enlarged quite readily and given rise to some pain. The pains radiated along the course of the intercostal nerves. The tumor was of the size of a green nut, hard, slightly bossed, skin unchanged in color, and freely movable. It was incorporated with the rib. It was either a sarcoma or an enchondroma. There was a formal indication for excising it.

December 30, 1889. Under chloroform, longitudinal incision, excising of the tumor, and scraping of the rib and cartilage at point of implantation. Listerian dressing. Almost immediate union, with very slight suppuration. Discharged January 14, 1890.

Case XX.

Alsberg's third case, 1892, secondary carcinoma. From Caro, *Deutsche med. Wochenschrift*, 1893, p. 57.

Female, aged fifty-five years. Four years before admission the left mamma had been removed for carcinoma and twice in 1892 small recurrences had been removed. In October, 1892, she came back with a recurrence over the sternal ends of the fourth and fifth ribs. This was the size of the palm of the hand. The fourth and fifth costal cartilages and 3 cm. of the fourth and fifth ribs were removed. There was a tear in the pericardium 2 cm. in diameter. This was closed when the flap was brought down to cover the wound; the pleura

was not opened. The wound was sutured, and after three weeks it had healed and the patient was doing well.

Case XXI.

Bardeleben's second case, 1892, periosteal sarcoma (*Bericht u. d. chir. Kl. des. Geh.*, Prof. D. von Bardeleben *für die zeit*, vom. i. April, 1892, bis märz, 1893, von Stabartz Dr. Tilman *Charité Annalen*, xix., Berlin, 1894, 320 and 321).

This was a man, aged twenty-one years, bookbinder. He had suffered since childhood from a discharge from the ear. In November, 1891, he suffered from intermittent pains in the right side. At the end of 1891 there was a gradually increasing swelling of the right side of the chest until, in June, 1892, it had reached the size of a child's head, reaching from the fourth rib nearly to the arch below, and posteriorly, to the angle of the scapula. Measured with calipers, the length was 17.5 cm., breadth 10 cm. It was adherent to the chest wall. The tumor was elastic and the skin was movable over it.

Operation: The incision was in the form of a "T." The seventh and eighth ribs were involved and partly destroyed. The sixth, seventh, and eighth intercostal spaces up to the vertebral column were filled with tumor masses. The sixth and ninth ribs were only overlaid by the tumor. Radical extirpation was not found possible. The superficial mass only could be removed. Shortly after the operation there was collapse. Four hours later the temperature was 35.3°; pulse 152, very small. Camphor and ether injections, subcutaneous infusion of 190 grammes of salt solution; autotransfusion. Coffee and sherry were tried without avail. Exitus letalis ten hours after the operation. Autopsy shows universal anæmia.

Case XXII.

Bardeleben's third case, 1892, osteosarcoma. For reference, see second case.

This patient was a laborer, aged forty-nine years. He suffered in 1890 of sarcoma of the right chest wall. This

disease was removed with partial resection of the seventh, eighth, ninth, and tenth ribs, and a large part of the costal arch, as well as thumb-sized projection reaching to the liver, which was tied off. The healing had been very slow; the patient was finally discharged with a fistula. In 1892, when coming under von Bardeleben's observation, this fistula still existed. In addition, a doughy tumor was seen from the third to the seventh ribs. The fistula seemed to go directly into the tumor. The fistula was split for 10 cm. and was found surrounded for 4 cm. of its length by new bone in tubular form. The fistula led to a necrotic point on the posterior surface of the sternum, at the beginning of the xiphoid process. This disease was removed with the chisel, and the soft mass scraped out with a sharp spoon and washed out with benzoated tincture. Moss dressing. Healed only after five months. Manifestly here was some remnant of the tumor, and it is remarkable that in one and a quarter years neither metastasis nor extension of the growth had occurred. The liver showed no special enlargement in spite of the fact that the tumor seemed to come from it. The upper edge corresponded to the seventh rib; the lower edge projected 3 cm. below the ribs in the parasternal line.

One and a half years later, at the time of this report, the patient felt entirely well. The cicatrix was loosely attached to the subcutaneous tissue; liver not enlarged, and no disease elsewhere.

Case XXIII.

König's fourth case, 1893, osteosarcoma (round-celled). Paget's *Surgery of the Chest*, 1896, p. 180, No. 22; see also Quénu and Longuet (*op. cit.*), p. 393, Case No. 10.

This was operated on in 1893. Female, aged thirty years. The growth had been noted a year; it had been of slow growth and without pain. It was a hard tumor the size of a hen's egg, lying from the sixth to the eighth left cartilages, just where they join the sternum. It was a round-celled sarcoma. Subperiosteal resection of the sixth, seventh, and eighth ribs, and cartilages, about two and one-half inches of each. A

piece of the wall the size of the hand was removed. The growth had invaded the mediastinum, but was removed without opening the pleura. The pulsation of the right ventricle was clearly seen. She recovered in three weeks. There was gangrene of the attached skin over one end of the resected cartilages. There was no recurrence nearly two years later.

Case XXIV.

First case of Quénu and Longuet, 1896, osteosarcoma (*Revue de Chirurgie*, May 10, 1898, p. 400).

Man, aged fifty-two years, admitted August 13, 1895. Began in 1892 as a small, indolent tumor on the posterior aspect of the chest. This was extirpated in the service of M. Polaillon. The patient left the hospital incompletely cured, the wound being still unhealed. A month later recurrence was already manifested, but he would not immediately consent to operation.

In August, 1895, when he came into our service, the tumor was of the size of an orange, fairly well rounded, seated below the angle of the scapula. At its summit was an ulceration from which flowed a grayish detritus. There was occasional oozing of blood. No axillary involvement. The base of the neoplasm was not manifestly incorporated with the ribs. The second extirpation was now undertaken. This operation went to the periosteum of the sixth rib, which appeared only superficially involved. A fragment of this rib was resected. The other ribs were sound. The wound, which was closed with difficulty, showed a second recurrence a month later. Examination before the third operation showed a mass of the size of the fist, situated behind and below the left shoulder blade, ulcerated at its summit, expanded, and smooth at its base, which was incorporated with the skeleton. The skin was red and thin. No mobility, no pain. General condition good.

Operation, November 15, 1896. After having separated the tumor from the surrounding parts, not without some difficulty, a series of small resections all about the mass were

made with the end in view of mobilizing a large portion of the thoracic wall, on which the tumor was seated. Thereupon the tumor was separated under the ribs by the method of pleuro-parietal stripping. The pleura, being thick, was quite easily denuded. Through it the movements of the lung could be perceived. The wound could not be completely covered. A hiatus of the size of the palm of the hand remained. Immediate autoplasty was practised by fashioning a broad, quadrilateral flap, pedicled in the neighboring parts, twisted on its pedicle and sutured to the circumference of the wound to be filled in. Healing *per primam.*

Inoperable recurrence three months later. Death from cachexia four months later.

Case XXV.

Second case of Quénu and Longuet, 1896, osteochondroma (*Revue de Chirurgie*, May 10, 1898, p. 401).

Man, aged nineteen years, entered October 19, 1896. Began three years ago as a small nodosity of the size of a hazelnut, seated on the third rib, left side. It increased without pain to the size of a walnut, and became visible externally. It was for this deformity he came to be cured.

On examination the tumor was of the volume indicated. Amalgamated with the anterior extremity of the third rib. Was fairly well rounded, of elastic consistence, and without pain.

Operation October 23, 1896. The tumor was dissected out, the fibres of the great pectoral muscle being easily separated. The third costal cartilage was denuded with the rugine, likewise the anterior extremity of the third rib, 5 cm. of this chondro-costal fragment being resected. This had served as a support for the neoplasm. The pectoral fibres were sutured, and the wound closed by superficial cutaneous sutures. The movements of the lung and heart could be plainly seen through the thin and supple pleura.

Union per primam. Six months later no recurrence.

Examination of the specimen showed a cartilaginous consistence; the implantation appeared to be at the union of the

cartilage and rib, but it was hard to determine whether one had to do with an enchondrose or an enchondrome. The histological examination demonstrated its origin from the rib and its purely cartilaginous structure—that is, of hyaline tissue with very large embryonal cartilage cells.

Case XXVI.

Case of Coley, 1896, osteochondroma of rib (*Annals of Surgery*, xxiv. p. 52).

"Dr. Coley presented an osteo-cartilaginous tumor, weighing two pounds, which had been successfully removed by operation from the right chest wall of a man aged twenty-five years. Since birth the man had similar small growths on one humerus and both tibiæ. Four years ago was first noticed a small tumor in the right side of his chest about the region of the nipple. This was from the first firmly attached to the rib, and appeared to be similar to the congenital tumors. It slowly increased in size until it became a mass about the size of a cocoanut, extending from near the middle line to the anterior axillary line, and from a point two inches below the clavicle to the free borders of the ribs. The mass was markedly protuberant, nodulated, and firmly adherent to the chest wall. The skin over the tumor was normal; the general health was unimpaired.

"In the operation for its removal the pleural cavity was not opened; there was very little loss of blood, and the patient bore the operation well."[1]

Series II. Cases in which the Pleura was Opened, Either Accidentally or Deliberately.

Case I.

Richérand's case, 1818; carcinoma. (Account of a resection of the ribs and the pleura, by M. Le Chevalier Richérand. Read before the Royal Academy of Sciences of the

[1] Three cases in Quénu and Longuet's list: two of Demarquay (fibro-sarcoma) and one of Morell-Lavallée (chondroma) are omitted because in none of them was the chest-wall involved.

Institute of France. English translation by Thomas Wilson, 24 pp., 8vo. Philadelphia, Town and others, 1818.)

GENTLEMEN: I have the honor to inform you of a surgical operation of which the record of the art furnishes no example—a new operation demanded by necessity and justified by success.

M. Michellan, surgeon at Nemours, for three years had been afflicted with a cancerous tumor in the region of the heart, the eradication of which a neighboring surgeon attempted in January last. At the removal of the first dressing a bloody fungus appeared in the centre of the wound; cauterized at each dressing, it grew again with activity. A second operation was attempted. This penetrated more deeply. After having laid the ribs bare he went to the pleura; in the meantime new fungi displayed themselves, and were reproduced, notwithstanding repeated cauterizations, by means of which it was endeavored to repress them. Grieved at not reaping any benefit from so many and so painful operations, the patient came to Paris toward the end of March, fully determined to suffer everything in hopes of being delivered from so dreadful a disorder, and of escaping an inevitable death.

At this period an enormous fungus was springing up in the wound. From this brown and flimsy vegetation oozed an abundant sanies, reddish, and so fœtid that it was impossible to remain a quarter of an hour near the patient without renewing the air of the apartment. The pains, nevertheless, were moderate; he experienced neither sweats nor colliquative diarrhœa; and, although tormented with an old and habitual cough, the patient, aged forty years, of a robust complexion, presented the most encouraging moral disposition. In this state of things it was resolved to attempt a resection of those ribs from which it was thought the cancer originated. Entrusted with this operation, I informed the patient that very probably I should be obliged to cut away a portion of the pleura; he did not hesitate to submit himself

to that operation, all the consequences of which we did not conceal, and which he was able to appreciate.

All things being ready, I proceeded thereto on March 31st, encouraged in this bold undertaking by the enlightened as well as active assistance of my colleague, Prof. Dupuytren, and by other persons of the art who were so good as to lend me their co-operation. The patient presented himself to the instrument, refusing to be held by the surgical aids, and promising a firmness which did not belie itself.

I began by enlarging the wound, giving it a crucial form. I thus uncovered the sixth rib, which appeared to be inflated and uneven in about four inches of its length; with a buttoned bistoury, the point of which I conducted along the upper and lower rims, I cut the intercostal muscles; afterward with a small saw, whose denticulated edge was only fifteen lines in length, I sawed the bone at the two extremities of the part affected.

This being done, I detached from the pleura the fragment thus isolated by employing therefor a simple spatula. I found in this an unexpected facility—a facility which proceeded from the condensation of the pleura beneath the bone, as the sequel of the operation has proven.

The seventh rib was laid bare for the same extent, isolated and detached in the same manner, but with much more difficulty and not without a slight tearing. The pleura discovered itself then, evidently diseased, thick, fungous, and giving birth to the vegetation in the space of the portion of the ribs taken away. The cancerous state extended itself above the sixth rib, so that the membrane appeared affected in about eight square inches of its extent. To make no excision of it was to leave incomplete an operation which lasted for twenty minutes, and until the present moment successful. Each of the assistants prepared himself with something capable of stopping the excessive hemorrhage, which was to be dreaded at the moment when I should make the section of the intercostal arteries. I cut the pleura with scissors whose blades

were crooked on the side of the edge; and either that the section operated by this instrument—which cuts less in sawing than in pressing, and bruises the tissue which it divides—had determined the retraction of the vessels, or that their size had diminished in consequence of the antecedent cauterizations, there did not run a drop of blood, but at this moment the exterior air made an eruption into the chest, rushing in with violence and compressing the left lung, which, with the heart enveloped in the pericardium, was borne toward the orifice. I sought, by placing thereto the left hand, to moderate the entrance of air and to prevent suffocation, which appeared imminent, while with the right hand I applied on the wound a large bolster spread with cerate. The entrance of the air was suddenly stopped by this greasy cloth, large enough to cover not only the wound, but moreover all the side of the chest corresponding. I fixed above a large and thick piece of lint; I covered it again with some bolsters, and supported all the apparatus with a rolled bandage, middling tight.

The anxiety and difficulty of respiration were extreme during the twelve hours which succeeded the operation. The patient passed the night entirely in a sitting position. Toward morning sinapisms, applied to the soles of the feet and to the inner surface of the thighs, rendered the respiration more easy. From that moment the pulse grew higher and the strength was reanimated. The patient took nothing else for his drink and diet than an infusion of flowers of the linden tree, and of violets sprinkled with some drops of water distilled from orange flowers and sweetened with the syrup of gum arabic. Three days passed thus: The fever was abated, and the oppression sufficiently great to deprive the patient of sleep. The first dressing was removed ninety-six hours after the operation. The pericardium and the lungs had contracted adherence with the contour of the quadrilateral aperture, a kind of window made in front of the heart. Happily the adhesion between the pericardium and lungs was not complete; for, from the sixth to the twelfth day, through want

of this adhesion, an abundant serum had run from the chest and gushed out at each dressing. The quantity of serum which ran by that in the space of twenty-four hours might be reckoned a half pint. On the fifteenth day this serum, produced by an inflammation of the surfaces, ceased to run, and on the eighteenth day the adhesion between the pericardium and the lungs was completed. The air thenceforward ceased to introduce itself through the wound, the patient could lie on his side, and his sleep and appetite were entirely restored.

The wound, although until then dressed with a greasy linen rag immediately applied to its surface, rapidly diminished and exhibited a better appearance. On the twenty-first day the greased linen rag was dispensed with, and the dressing was applied as for a simple wound. The surface was covered with fleshy pimples, which had sprung up from the lungs and the pericardium.

The patient, who had for some days made trial of his strength in a garden belonging to the house which he inhabited, could not resist the desire of riding in a carriage through the streets of the capital. Having experienced fatigue from a ride of five hours, in which he visited the School of Medicine and caused to be shown him the parts of his ribs and of his pleura deposited in the cabinets of that establishment, nothing could prevent him from departing on the twenty-seventh day after the operation, or from returning to his place of residence, where he arrived without accident, provided with a piece of boiled leather large enough to cover the cicatrix completely when perfected.

I suffered not the opportunity to escape which presented itself to prove anew the perfect insensibilty of the heart and pericardium. Nothing warned the patient of the touch of the fingers softly applied to the organs. In the state of life the pericardium in man is possessed of such a transparency that the heart is seen through this membrane as if it were under a glass bell, perfectly diaphanous; it is so much so that we might have been led to believe there were no envelopes. It

is so far from being so that this complete transparency is found in the pericardium of dead bodies, and it appears to me that, in this point of view, this membrane may be compared to the glass of the eye, which becomes dim and obscure at the approach of death. A large aperture, with loss of substance in the contour of the chest, not being necessarily followed by suffocation, a bloody discharge, or by a mortal inflammation of the organs toward which the exterior air finds there a free access, it appears to me there could be effected, in a disease to which the patient would succumb, for example, a dropsy of the pericardium. I say there could be effected in front of the heart an aperture which would not only permit the water in which that organ is immersed to discharge itself, but also to effect a radical cure of the disorder by determining the adhesive inflammation of the surfaces, by processes similar to those used for the cure of the hydrocele.

The same operation would be justified in order to expose the lungs partially affected and in taking away some parts of them by binding them with ligatures. It will certainly be said that like enterprises are rash; but how many operations deemed impossible within the last fifty years obtain in our day the most brilliant and best attested success?

(M. Richérand requests his professional brethren to whom a patient not too much debilitated by age or disease, affected with the hydropericardium, should present himself, to address the same to himself if they do not prefer to attempt themselves the operation he proposes.)

I will not occupy much longer the time you have been pleased to grant me; it is for those among you who are particularly engaged in the improvement of surgery to apprise me whether, in the views I propose, I am not left to misconceive by a vain desire of improvement; it is to those to whom it belongs to judge whether the fact which I submit to their sagacity can contribute in some measure to the advancement of the science as well as the comfort of humanity.

April 28, 1818.

NOTE.—The patient had rapid recurrence, and died one month later.

CASE II.

Case of Sédillot, 1855, sarcoma. Gerulanos, *Deutsch. Zeitsch. f. Chir.*, October, 1898.

Sédillot resected two ribs with corresponding part of pleura and a piece of the lung. Recovered. Nothing as to recurrence.

CASE III.

Case of Schuh, 1861, chondroma. Leonhard Meyer, *Inaug. Diss.*, Erlangen, 1889.

This was a man, aged sixty years, suffering with a large enchondroma reaching from the third to the seventh ribs, and from the left sternal edge to the axillary line, left side. In attempting to peel out some process of the tumor with the finger in the third and fourth intercostal spaces the pleura was opened; with a whistling sound the air rushed in. The opening was quickly stopped with the finger, and the operator cut away the upper part of the tumor and laid the soft parts over the remainder of the tumor, uniting the wound, and put on a compress dressing of charpie, held with plaster strips. He died in two days from pneumothorax.

Weinlechner comments on this case: "To-day the lethal termination would, perhaps, be prevented by drainage of the thoracic cavity carried out under Listerian principles." (L. Meyer, *Inaug. Diss.*, 1889.)

CASE IV.

First case of Heyfelder (J. F.), 1861, chondroma (*Beiträge zur genaueren Kenntniss der Thoraxgeschwülste, Berliner klin. Woch.*, 1868, v. 369).

This was a man whose age is not stated. The tumor was a costal enchondroma, thirteen inches in breadth, with a vertical measurement of eleven inches, situated on the right side. The tumor was indolent. The skin could be picked up over the tumor. The tumor was very slightly movable, moder-

ately soft and elastic, rounded in shape. It seemed from the rapid growth to be a pseudoplasm(?). The patient had sustained a fracture of the seventh and eighth ribs one year before. A tumor began before the wound healed, and grew rapidly without pain. The man said if Heyfelder would not remove it he would hunt until he found some one who would do it.

Operation: The operation was begun by a semilunar incision over the under part of the tumor. The seventh and eighth ribs, which supported the tumor, were resected, together with the involved pleura. The hemorrhage was quite abundant. After the stopping of the hemorrhage the wound was closed. He did well until the fifth day, when the temperature rose and the pulse became quickened. During the night of the fifth day he died so quietly that it was scarcely observed by the attendants.

Case V.

Second case of Heyfelder, 1861, chondroma. A tumor for ten years, the size of a pigeon's egg, then suddenly growing rapidly, in three months filling the space from vertebral column to sternum, from clavicle to a point below not stated. Died in the first week.

Case VI.

Third case of Heyfelder, 1861, chondroma. G. L., aged thirty-three years; ten years before suffered of a breast inflammation. The tumor had been growing since 1851. Right side.

Operation, March 25, 1861 (?). Exposed two to three inches of the fourth rib, which was carious. Pleura dissected loose. Died April 7th. At autopsy third and eighth ribs were shown to be involved. A fist-sized tumor was found involving the pleura at the fourth rib, attached to and involving the lung.

He felt doubtful whether he could have done the operation completely.

Case VII.

Case of Langenbeck, 1873, sarcoma (Reported by Israel. *Eighth German Congress for Surgery*, 1879, p. 45).

This case was operated on in the year 1873 by Langenbeck. A woman, aged thirty-two years, with a sarcoma in the left lateral thoracic region. The tumor was the size of two fists, and involved two ribs and the corresponding costal pleura. The wound was washed daily with carbolic water, and the patient ultimately died three months after operation from carbolic intoxication. The urine had become almost black, but the irrigations were persisted in. So little was known at that date about carbolic poisoning that the condition of the urine did not warn of the carbolic intoxication. This case was most likely a victim of antiseptic irrigation.

Case VIII.

Case of Israel, 1873, sarcoma (Langenbeck's *Archiv f. klin. Chir.*, 1887, Band xx. p. 26).

H. W., pale and suffering from stomach troubles, presented herself, showing an elastic tumor of mamma size, seated upon the left wall of the chest in the axillary line, having no connection with the quite healthy mamma. At the extirpation it was shown that the sixth rib passed into the tumor. The pleura was torn in two places; air and blood entered the pleural cavity; consecutive pleurisy, with foul secretion; discharge through the lung. There was obstinate vomiting of all ingesta. Death followed after three months from exhaustion. Chronic septicæmia (?). At the autopsy no metastases and no deep disease were found. The left pleura, about the size of a fist, was filled with thick clots, and there was marked anæmia in all organs.

This case is not found in Quénu and Longuet's table, but Gerulanos gives it as a separate case from Case VII., and Cases VII. and VIII. are described separately in the reference given. Plitt, besides, gives it as a distinct case. While

there are some points of resemblance, the internal evidence seems to be in favor of its being a distinct case.

Case IX.

Case of Cassidy, 1874, chondroma (*Canada Lancet*, 1874–1875, vii., reported by Sylvester).

W. H., aged twenty-nine years, a laborer, came to the Toronto Hospital as interne, January 25th, complaining of pain and a hard tumor on the right side, situated on the sixth and seventh ribs midway between the spine and sternum. About six years ago he noticed a small, hard tumor, the size of a pea, at first movable; kept growing until about six weeks ago, when it became painful and sore. It had reached now the size of a man's fist, hard and immovable, attached to the sixth and seventh ribs. Diagnosed as an enchondroma, and operation deemed advisable. The doctor made a horizontal incision over the tumor, dissected back over the margin on each side and got well down; introduced fingers into the wound to feel for pedicle and separate surrounding tissues. His fingers accidentally entered the right pleural cavity. The external air at once rushed in and completely filled the space, compressing the lung. Did not interfere with operation; with bone pliers the tumor was nearly all removed. Found to be quite hollow, centre having undergone fatty degeneration. Hemorrhage very slight, wound soon closed up and brought into apposition by plaster covering the whole surface. He was discharged in six weeks; wound completely closed, and respiration on both sides normal.

Treatment: First antiphlogistic and then tonic; good, nourishing diet.

Case X.

Case of Wattmann, 1878, chondroma (Albert's *Lehrbuch der Chirurgie*).

In the earlier editions of Albert's *Lehrbuch*, in speaking of the rashness of some surgeons in removing large chondromata, Albert refers to a case of Wattmann, related by Dumm-

reicher, in which Wattmann attempted to dissect the pleura from the posterior surface of a tumor, but was unfortunate enough to open the pleura, so that the patient died of pyopneumothorax.

This case is No. 25 in Schläpfer von Speicher's list, but he gets it from the same source, so that no additional information can be gotten from him. The case is not mentioned in the last edition (1898) of Albert's *Lehrbuch der Chirurgie*.

Case XI.

Case of Kolaczek-Fischer, 1878, chondroma (Reported by Kolaczek in *Deutsche Gesellsch. f. Chir.*, viii. 2, x. p. 80). This is a particularly interesting case, as it was on the border line between the pre-antiseptic and the antiseptic era. The successful result in this case gave a great impetus to the surgery of the tumors of the thoracic wall and to surgery of the chest in general.

It was operated on in the year 1878 by Fischer, and the patient was presented by Kolaczek at the meeting of the Eighth German Surgical Congress, in April, 1879.

C. S., female, aged forty-eight years. She had an enormous tumor of the left side of the chest, extending from the clavicle to the costal arch. It seemed to have originated from the fourth rib, and had a history of four years' development at the time of operation.

The operation required resection of parts of the fourth, fifth, sixth, and seventh ribs, and the subjacent pleura. The defect in the pleura was of the size of a child's head. There was at first powerful expiratory expansion and bulging forward of the lung, which thereupon immediately collapsed. Respiration became very anxious and the pulse failed. The dyspnœa for a time was intense, and the narcosis had to be suspended. The operation was rapidly finished and the patient's condition improved. The wound was sutured, provision being made for drainage. A salicylic acid solution was used for washing out the pleural cavity. Following the operation there was moderate dyspnœa, weakness, and anxiety, and

the fever rose on the third day to 39.8°. There was a suppurative pleurisy and bronchitis, which Maas and others attributed to the antiseptic irrigation. By the third day the markedly drawn-in skin had formed adhesions with the lung and the pericardium. She made a good recovery, and was discharged four weeks after operation. There was recurrence one year later, which Kolaczek removed by resection of 3 cm. of the third rib, the tumor being the size of a walnut. She died August 18, 1881, in the hospital at Munich.

There was fungous disease of the ankle-joint and caries of the bones of the foot, for which she had declined all operation. The lung was found adherent all around to the thorax and only 1½ cm. in thickness. This case is shown in Figs. 1, 2, and 3.

This woman was the patient on whom von Ziemssen made some valuable investigations concerning the physiology of the heart. She had been examined in various hospitals in Germany, and was finally sent to Munich to see von Ziemssen. She was in Munich in August, 1879, and again in the fall of 1880. Von Ziemssen saw her in 1880. There was a defect in the chest wall measuring 9 cm. by 11 cm., bounded by the second rib above and the seventh below. The defect had a depth of 9 cm. The skin being drawn in, the lung lay along the vertebral column from its apex to the diaphragm; the nipple was well drawn into the cavity. The observations of von Ziemssen can be found in his studies on the "Movements of the Human Heart of Catharina Seraphin," published in the *Deutsche Archiv f. klin. Med.*, 1882, Band xxx. p. 270.

Case XII.

Tietze's first case, 1879, giant-celled sarcoma (*Deutsch Zeitschrift fur Chir.*, 1891, Band xxxii. Reported from Fischer's clinic).

J. G., aged forty-six years, coachman, admitted to the clinic July 26, 1879. There was a history of injury, being kicked by the hind foot of a horse three years before. The tumor was of the size of a child's head, spherical in shape, situated on

Fig. 1.

Tumor before operation.

Fig. 2.

After recovery from operation.

For these admirable reproductions I am indebted to the kindness of Dr. Robert Fletcher, of the Surgeon-General's library.

the right side of the chest between the parasternal line and the anterior axillary line. The tumor was immovably adherent to the sixth, seventh, and eighth ribs, non-fluctuating, but elastic. The skin over it was smooth, but showed venous turgescence.

Operation: Vertical incision. In the attempt to separate the tumor at its base the seventh rib was broken and considerable hemorrhage ensued. About 10 cm. each of the sixth, seventh, eighth, and ninth ribs were resected. There was adhesion of the diaphragm to the tumor, and in separating it the pleura was torn. On account of the adhesions the lung did not collapse, and the dyspnœa was slight. The loss of blood was marked, and the subsequent dyspnœic attacks were severe. The wound was sutured and drained. On the second day there was œdema of the lung and hemorrhage into the pleura and pericardium and endocarditis. Death on the second day. These latter notes were findings of the post-mortem.

Case XIII.

Leisrinck's case, 1880, sarcoma (round-celled) (Langenbeck's *Archiv*, Band xxvi.; Plitt's *Inaug. Dissert.*, Berlin, 1890).

J. S., aged thirty-seven years, had first noticed the disease only four months before, after a blow two months previously, which he thought had fractured a rib. There was a large tumor of the ribs, right side, extending from the fifth rib down to the lower border of the thorax, and from the edge of the sternum to the lower angle of the scapula. He was a strong, fine-looking man.

Operation: The incision was oval; extended from the fifth costosternal junction down to the costal arch, and thence up to the inferior angle of the scapula. The sixth and seventh ribs were resected from near the sternum backward for nearly their whole length. The pleura was torn, and, as the growth had begun to attack the diaphragm, a piece of the diaphragm was removed, about an inch and a half in diameter. Through the hole thus made the liver and some coils of intestine pro-

truded, and had to be put back; the diaphragm was sutured. Instantly, when the pleura was opened, the patient collapsed, the pulse became very irregular and small, and the respiration embarrassed. Under ether injections (subcutaneously) and faradization of the phrenics he revived. The wound and pleural cavity were washed out with salicylic solution and sutured with two large drains. There was terrible cough during the night; next day respiration shallow, temperature 39.1° C. Thirty hours after operation lung sounds could be detected to the fourth rib. At first he improved, then dyspnœa came on, and the temperature mounted to 40.3° C. He died of suppurative capillary bronchitis, without infection of the pleural cavity, on the fifth day. The wound in the diaphragm was firmly closed.

Case XIV.

Weinlechner's case, 1880, myxochondro-sarcoma (*Wiener med. Woch.*, 1882, Nos. 20 and 21).

This was a man, aged thirty-seven years. Operated on in 1880. The tumor was the size of a man's head, involving the third to the fifth ribs of the right side. For the most part hard, but soft in places. It had been noted four years before, but after a blow seemed to have grown very rapidly. The third, fourth, and fifth ribs were resected with the involved pleura. The lung collapsed at once, and the condition of the patient was bad. The dyspnœa was severe, pulse small. A piece of the lung "the size of a saucer" was removed, and two small nodules from the upper lobe of the lung. When the pleura had been widely opened the patient seemed to be in the pangs of death, with very bad pulse, and the operation had to be hurriedly finished. The thymol spray was used during the operation. The wound could not be closed, as there were no flaps, so it was packed loosely with gauze and sponges. In the afternoon there was still dyspnœa; small, weak, accelerated pulse. Death after twenty-four hours from collapse and suppurative pleurisy (?).

Case XV.

Krönlein's case, 1883–1888, sarcoma (*Deutsche Zeitsch. f. Chir.*, 1893, p. 37 ; Müller's article).

This was a woman, aged eighteen years. In June, 1883, she had a tumor on the left side which had begun eight months previously, and had reached the size of a child's head. This was connected with the sixth rib, which was resected and the tumor removed. Six months later a piece of the chest-wall, of the size of the palm of the hand, was removed, together with a growth in the lung of the size of a walnut. The space, resulting from the former operation, had been filled in, with a recurrence, which extended from the fifth to the seventh rib. The wound was sutured with catgut. The patient recovered, the wound healing in four weeks. In March, 1887, three years later, there was a recurrence above the old cicatrix. The fifth rib was resected and the thorax again widely opened and a piece of the lung excised; the lung collapsed and the patient became very cyanotic. The pleural cavity was washed out with 1 : 5000 sublimate solution. She returned in August, 1888, showing a recurrence in the region of the former operation. Further operation was declined. On November 29, 1890, she died of pneumonia.

Case XVI.

Humbert's case, 1884, sarcoma (*Révue de Chirurgie*, 1884, vol. vi. p. 297).

L. B., aged twenty-one years. Operated on, February 12, 1883, by Dr. Peyrot, the diagnosis being periosteal sarcoma of the ribs. A second operation was done on December 5, 1883, by Dr. Nicaise. Patient again presented herself for treatment in December, 1884. The growth now involved the seventh, eighth, and ninth ribs, and was very painful.

Operation : Two vertical incisions in the form of a very elongated ellipse, which took in the old scar. Two other transverse incisions were made— one above, the other below. Two cutaneous flaps were thus thrown off, exposing the

tumor. It adhered to the seventh, eighth, and ninth ribs and the adjacent intercostal spaces. The eighth rib, completely involved in sarcomatous tissue, was fractured during the manipulation. The three ribs were dissected clear and then resected to the extent of 9 cm. each. He then made an incision along the sixth intercostal space and carried the knife down through the points of section of the ribs in front and behind. There was some escape of sero-purulent fluid. He was now able to pull down a sort of trap-door, which was adherent only below. On its internal surface the deep part of the tumor showed in relief, well circumscribed in appearance. This opening disclosed a large cavity lined with false membranes. The lung, pressed backward, occupied the depth of this cavity.

This thoracic flap was now grasped with the fingers of the left hand and the scissors carried cautiously along the ninth intercostal space, so as to be certain of passing beyond the limits of the tumor. He had still to resect a small fragment of the ninth rib, which seemed suspicious of malignancy. In clearing the pleura he perceived on the floor of the pleural cul-de-sac, near the inferior border of the thoracic opening, a hole 2 cm. by 7 cm. in extent. Taking this to be an accessory cavity, he introduced his fingers, but was not a little surprised to come upon a smooth surface, limited below by a sharp edge. This proved to be the liver, and he was in the peritoneal cavity.

With the aid of a mirror he was able to see clearly this viscus, the upper part of the ascending colon, and some intestinal coils. It was evident that he had accidentally cut a part of the diaphragm which adhered to the tumor. Examination of the tumor showed small bundles of muscle-fibre, broken down by the disease, but the peritoneal lining had as yet suffered no alteration. Some clots discovered on the surface of the liver were removed by means of a mounted sponge. Having made as well as possible the toilet of the peritoneal cavity, he closed the diaphragmatic wound with five points of strong catgut suture. The pleura having been cleared by

curettage of adhering false membranes, the wound was sutured, a drain being left at the inferior angle. An antiseptic dressing was applied. The patient was in a condition of pronounced algidity for twenty-four hours, and required hot applications. Recovery was without further incident, and she left the hospital February 6, 1884, less than two months after the operation.

In 1886 there was still no recurrence.

Case XVII.[1]

Case of Helferich, 1885, sarcoma (Reported by R. Heigl, *Arbeiten aus dem med. klin., Institute der K. Ludwig-Maximilians-Universität zu München*, Band ii., 1 Hälfte, Leipzig, 1890, p. 405; also *Deutsche Archiv f. klin. Med.*, Leipzig, 1889, xlv. 27–42).

A. W., aged ten years, son of a peasant, of G. in Oberbäyern, was admitted into the stationary division of the K. Chir. Poliklinik at Munich, showing in the left pectoral region an oval-shaped tumor about the size of a man's fist, on all sides sharply bounded, covered with normal skin, and lying under the musculature. It extended from the under edge of the clavicle above to the upper border of the fifth rib below, and from the middle line of the sternum, internally, to the anterior axillary line, externally. Length, 12 cm.; breadth, 10 cm.; of firm consistence; no pain; no glandular involvement. Conformation of the ribs unaltered. Chest organs sound.

Diagnosis: Sarcoma. Nothing in the history, except that it was noticed first at the end of April.

Operation, May 30, 1885, by Prof. Helferich. The operation consisted in the cutting of a musculo-cutaneous flap and its reflection upward, freeing of the tumor, and resection of the fifth, fourth, third, and second ribs in the anterior axillary line, and of their insertions, with saving of the periosteum. At the second rib a large piece of the sternum could be saved, but a part of the manubrium had to be removed.

[1] This case has been improperly placed here; should be included in Series I.

The resected parts of the ribs were bent inward and leveled. During this manœuvre nearly the whole pericardium and a large part of the costal pleura were exposed to view. The heart and vessels could be distinctly seen through the delicate pericardium, while the sharp edge of the lung could be studied during the respiratory and cardiac movements.

The healing of the wound, at the beginning disturbed by an enormous acceleration of the heart's action and dyspnœa, later became quite smooth. Microscopical examination of the tumor showed typical fibrosarcoma. The defect was protected by a soft pad.

Discharged July 13th. Over both lungs vesicular breathing, even in the defect. The effect of atmospheric pressure was almost absent, being apparent only on its inner edge. The regular rhythm of the heart could be well differentiated from the forward bulging caused by the air-filling lung, which was observed more laterally. Normal heart sounds; no pericardial friction.

In the summer of 1886 he was quite restored to health, and could be submitted to a more careful examination. There was no sign of recurrence, but there were some changes in the defect of the chest-wall, to be ascribed partly to physiological growth, partly to regenerative processes. Instead of an enlargement of the defect, as was to be expected, it had much diminished by the growth of the ribs and sternum. The sternum extended 2 cm. beyond the middle line above, and 4 cm. beyond at the ensiform cartilage. The axillary ends of the resected ribs reached now nearly to the mammary line, a firm, fibrous cord, extending from the second rib to the first costo-sternal joint. The fifth showed a conical movable process, running in a curved direction toward the sixth rib, somewhat pushed inward.

Measurements: Height, 134 cm.; chest measurements: in the axillary line, deep inspiration, 71.5 cm.; expiration, 66 cm.; ensiform measurements: inspiration, 73.5; expiration, 70. The heart pulsation fell during the long narcosis to 50 per minute.

Von Ziemssen studied the Heigl case during the winter of 1888–1889.

The boy was now fourteen years of age—a strong, healthy fellow. The defect in the chest-wall was not so large as in the Seraphin case (Case XI.). It had the form of an irregular triangle, the base being below, the inner side formed by the sternal edge. Vertical measurements 11 cm., breadth 8 cm. The heart could be felt in its whole anterior extent. Both lungs freely movable, and the lung of the affected side seemed to be functioning over a greater extent than in the other case. On coughing and enforced expiration the lung and heart are driven into the defect. There was absolutely no sign of recurrence.

Case XVIII.

Case of Maas, 1885, chondroma (Langenbeck's *Archiv f. klin. Chir.*, 1886, xxxiii. p. 314).

H. M., aged forty-two years, peasant, admitted into Juliusspital, Würzburg, February 19, 1885.

Mother healthy. Father died, probably of rectal carcinoma. Himself uniformly healthy, married, seven healthy children. Fifteen or sixteen years ago, after a blow from a heavy stick of wood, developed a tumor of the size of a hen's egg under the left shoulder blade. The injury was not severe, and he did not quit his work. The tumor grew slowly until five or six years ago, when he fell with a sack of pears from a tree to the ground on to the sack, which lay between him and the ground. Now the tumor grew more rapidly and troubled him greatly at his work.

When admitted he was a large, well-built man, but somewhat emaciated, with pale skin and mucous membranes. Chest and abdominal organs healthy. A large, vertical oval tumor occupied the posterior and lateral aspects of the left side of the chest, reaching from the (by it) slightly upward displaced scapula at the seventh rib down to the crista ilei and anterior spinous process, and laterally from a point in

front of the axillary line to within 3 cm. of the spines of the vertebræ. Greatest vertical measurements 41 cm., greatest breadth 37 cm. Skin normal except as to some dilated veins; could be picked up over the tumor, except at its apex, where the skin was quite stretched by the underlying growth. Tumor elastic, of cartilaginous hardness in some places; soft at the apex. The process reaching toward the pelvis was quite hard. Firmly fixed to the ribs.

Diagnosis: Chondroma or osteochondroma.

Operation, February 21, 1885. Under chloroform and a steam spray of acetate of alumina, patient lying on the right side (opposite) with a roll-cushion under him to raise the left thoracic and lumbar regions. Incision from inferior angle of scapula to left anterior spinous process, through skin and muscle. A second incision obliquely from the middle of the first, backward and downward through the skin and the back muscles. The exposed tumor, it could now be seen, was free above, and could be lifted from the ribs. It was firmly attached to the ninth, tenth, and eleventh ribs. The pelvic process had pushed its way downward between the musculature and the fascia transversalis to the anterior spinous process. Blunt dissection posteriorly, and cutting of the ribs with bone forceps made it now possible to lay the tumor forward. Now it could be seen that the pleura was firmly incorporated in front down to the diaphragmatic insertion. The pleura was cut first behind, and then the ninth, tenth, and eleventh ribs in the axillary line in front of it. There was nothing left to do but dissect up the lower projection of the tumor. This was accomplished without tearing the fascia or opening the peritoneum. Eleven cm. of the ninth, tenth, and eleventh ribs, with corresponding pleura, were resected. The defect in the wall was 11 cm. long and 7 cm. wide. The heart, covered with pericardium, the uninjured diaphragm, and the completely collapsed lung could be distinctly seen. The left kidney and the spleen could be seen shining through the transversalis fascia. The pulse sank from 80 to 60, and became small, but regular and

FIG. 3.

FIG. 4.

FIG. 5.

I am indebted to Dr. Robert Fletcher, of the Surgeon-General's Library, for the reproduction of these beautiful illustrations.

easily felt, the breathing slow but regular, so that the narcosis did not have to be interrupted nor any restoratives applied. The patient was now laid on the left side, and the blood in the cavity, partly by gravity, partly by sponging, cleared out. The wound was closed by two rows of sutures, one uniting the musculature, the other the skin, only a small opening near the upper end of the longitudinal wound under the scapula and another near the hinder end of the transverse incision were left unsutured. No other drainage. Later there was slight dyspnœa. Sublimate salt dressing. The tumor was made up of a large cyst and a great number of smaller ones.

The microscopic finding was osteochondroma myxomatosum.

After return of consciousness the patient had wine, which brought up the pulse to 72. The respiration was little quickened, and very slight dyspnœa, without cyanosis. No cough nor expectoration. The course of healing was quite favorable and undisturbed.

February 26th. Examination showed almost normal respiratory movements, and no abnormal sounds. In inspiration the wall was drawn in only moderately. Deep inspirations, sitting up in bed, even standing upright, gave no pain whatever.

The dressing was thoroughly soaked the first day, so that it was changed on the third day. Wound completely adherent. Dressing changed again on ninth day. Wound healed except at the unsutured openings, which granulated. Temperature was once up to 38.5°. Patient got up on the ninth day, and went home March 14th.

June 16th. Returned for examination. Health good; respiratory functions practically normal; both lungs came down to same level. The defect had narrowed itself to 3 cm. in diameter. No pleural adhesion. A small, movable tumor above. According to Quénu and Longuet this was removed, and fourteen months later there was no recurrence. This case is shown in Figs. 4, 5 and 6.

Case XIX.

Schede's case, carcinoma secondary to carcinoma of the breast (*Deutsche med. Woch.*, September, 1886, vol. xii. p. 646).

Woman, age not given. In 1882 the patient came for operation on the breast. In 1885 there was a return of the disease, and a second operation was done. A portion of the thorax wall, the size of a saucer, was removed. The ribs were broken down by the growth. The pleura showed small growths (nature not stated), which were not removed, although the pleura seems to have been opened. The wound was covered by a skin-flap, which came into direct contact with the lung. This patient was exhibited a year afterward, and showed no evidence of a return of the disease. (These data are taken from a report of a number of cases by Schede at a meeting of the Hamburg Medical Society, May 18, 1886.)

Case XX.

Case of Trendelenburg, 1885, myxochondroma (Leonhard Meyer, *Inaug. Diss.*, Erlangen, 1889; Baldus, *Inaug. Diss.*, Bonn, 1887).

This was a man, aged sixty-one years. There was a tumor seated on the anterior aspect of the left thorax, semi-spherical in shape, and reaching from the sternum to the anterior axillary line, and from the clavicle to the mamma.

Diagnosis: Chrondromyxoma. The incision was made from the insertion of the fourth rib obliquely across the tumor to the axilla; the flap was raised and the pectoralis major lifted, and the tumor uncovered in the direction of the external incision. Then a vertical cut was made perpendicularly to the middle of the first, reaching up to the clavicle. The pectoralis minor was cut across. The tumor was firmly fixed to the rib and evidently growing into the pleural cavity. It involved also the third and fourth cartilages, which were largely cut through. The tumor could now be lifted sufficiently to see the as yet uninjured pleura. In working downward and inward the pleura suddenly tore. The wound was

immediately covered with a sponge. There was furious bleeding from an intercostal artery, which stopped the operation for a time. After a little manipulation of the tumor it was easily drawn out. The pleura could now be seen over an area the size of the palm of the hand. Sponge-pressure was kept on the pleural tear, and the median piece of the second and third ribs was resected. Then followed suture of the musculature and skin, the pleura-covering sponge being drawn out before completing the closure of the wound. Drainage through the external angle of the wound; pressure bandage.

Discharged in three weeks, cured.

NOTE.—This seems to be the same case as that referred to incidentally in Witzel's account of his case (*Centralb. f. Chir.*, 1890, xvii. 523), in the following words: "The heart, however, here and in another former operation suffered more than was to be accounted for by the hampered respiration (this Witzel attributed to the flexion of the large vessels due to the dislodgement of the heart.) In the operation now referred to the tumor had become firmly attached to the middle lobe of the lung, considerably prolonging the procedure. The heart action was helped by the lateral support of a loosely rolled ball of iodoform gauze." Quénu and Longuet credit Witzel with two cases in their list. They give for both the same bibliographic reference as above, while in this reference, which is really Witzel's own article, Witzel mentions the case as one given in detail by Baldus in his *Inaug. Diss.* This corresponds in all respects to the Trendelenburg case now given.

CASE XXI.

Tietze's second case, 1886–1889, spindle-celled sarcoma (*Deutsch. Zeitsch. f. Chir.*, 1891, Band xxxii.).

R. H., aged sixty-six years, clergyman. In the fall of 1884 he fell and struck against a stump, bruising the right side. Shortly afterward considerable pain was felt, and in December of the same year a swelling was noticed close to the right nipple, increasing in size slowly, but with much

pain. Entered the clinic in 1886, the growth being the size of a female breast; the skin over it movable, but tumor adherent to the ribs.

Tumor at operation was found to be a nodular mass of soft consistency in the centre. The fourth and fifth ribs were broken down by invasion of the disease. The tumor was removed close to the level of the ribs, and the ribs then resected. The adherent pleura, which was easily separated, was slightly torn, but was immediately clamped and sutured. A drain was put in and the wound sutured. The patient was discharged after the fourteenth day.

July, 1887. A small recurrence, immediately removed by scraping.

In December of the same year a second recurrence. While under treatment gangrene of right foot developed, necessitating amputation at ankle. Patient discharged well in January, 1888.

April, 1888, a third recurrence at the same site. This was removed by the fourth operation. The growth involved the third rib, extending up into the intercostal space. The rib was cut at some distance from the tumor and the attempt made to lift the tumor out; but the pleura was markedly adherent, so that a piece of the latter of the size of a 5-mark piece had to be removed. The lung did not collapse, and the pulse remained unaltered, as likewise the respiration. When the pleura was opened the chloroform was discontinued. Toward the end of the operation the breathing became stormy in character, the right lung pressing strongly against the defect in the chest wall and ballooning out. The wound opening was tamponed with iodoform gauze and then sutured.

The patient recovered rapidly from the operation, and seemed for a time quite comfortable. On the fifth day the tampon was taken out and a part of the sutures removed. The remainder of the sutures were removed on the third day. Discharged on the eighteenth day. The tumor showed spindle cells, with intermingling of round-cells in some parts.

February 28, 1889. Recurrence for the fourth time. Dur-

ing the operation the pleura was again opened. After apparent convalescence for a time, on the fourteenth day after the operation the patient showed marked nervous symptoms, became delirious, and died two days later. Iodoform poisoning was not considered probable.

Case XXII.

L. Desguin's case, 1887, sarcoma, spindle-celled (*Bulletin de l'Académie Royale de Méd.*, Belgique, 1887, iv. s. Tome ii.; also *La Presse Médicale Belg.*, August 28, 1887).

This case was operated on in 1887. The patient was a man, aged forty-one years. A small tumor, seemingly inoffensive, developed slowly on the ninth rib and in its neighborhood on the right side. It began to be painful. There had been already two operations. Before the third operation it was found to be a sarcoma instead of a chondroma, and the tumor advanced rapidly in its growth. The sarcoma seemed to be of the spindle-celled variety. The eighth and ninth ribs of the right side, with adherent pleura to the extent of 4 cm. by 8 cm., were resected. Notwithstanding the inevitable pneumothorax, the healing was obtained by first intention, without a sign of pus and without any grave symptoms. The pneumothorax disappeared within a week, but the lung seemed only partially to expand, and the liver rose above the normal level. He recovered. The mildness of the manifestations on opening the pleural cavity were such as to surprise the operator.

The report was made four months after the operation. The Royal Academy of Belgium recognized the importance of the case and reproduced it in the report of its proceedings. It was remarked in this report that the case published by M. Desguin had no analogue for establishing the operation on a footing with pleural resection after the method of Estländer, more or less modified, having for its end the cure of pleural abscesses.

Case XXIII.

König's second case, 1887, myxochondro-sarcoma (From Gerulanos, and Paget's *Surgery of the Chest*, 1896).

This was operated on in 1887. Female, aged twenty-six years. She had broken a rib a year and a half previously. Six months later swelling was noticed at this point. There was no pain, but some tenderness. Below the right breast, over the sixth to the ninth ribs, was a large, flattened growth the size of a fist, giving a marked feeling of fluctuation. The eighth rib was resected with the adherent parietal and diaphragmatic layers of the pleura to the size of a thaler piece. The diaphragm was not perforated. The pleura, however, was freely opened. There was considerable dyspnœa for several days. Recovery took place in three weeks. The temperature rose to 39°, and was normal first by the twelfth day.

Recurrence three years later; very extensive; successfully removed by resection of the seventh and ninth ribs. There was invasion of the diaphragm. There was recurrence later (Campe).

Case XXIV.

Heineke's case, 1887–1889, sarcoma (Reported by Leonhard Meyer, *Inaug. Diss.*, Erlangen, 1889).

F. W., aged thirty-one years; married; parents living and well. Eleven sisters and brothers. One brother died of lung trouble at twenty-five years of age; one brother, now living, seventeen years of age, with a suppurating sore on the left leg. Always a healthy man until the winter of 1886-1887, when he had a cough without expectoration. He was the father of five healthy children. About Easter, 1887, he fell, striking heavily on the right side against a four-cornered timber. He suffered so much that he had frequently to see a doctor. There were pains in the side and painful breathing. At the end of September, 1887, he noticed a small kernel under the skin; by the end of October this had reached the size of an egg. He saw a physician, who advised opera-

tion, but he was fearful, and hesitated. The pain, however, became so severe and so kept him from sleeping at night that he came into Heineke's Erlangen clinic. This was December 10, 1887. The patient was middle-sized, not specially strongly built, but of good musculature and of moderately fat and pale skin.

Examination : The form of the thorax was rather paralytic ; the supraclavicular and infraclavicular spaces were sunk in ; clavicles were prominent, especially the left. There was slight flattening of the left apex. A tumor the size of a fist, raised about 4 cm., was seen at the lower part of the thorax. It was red in appearance, sharply bound, with an ovoid base extending from the scapular line to the posterior axillary line, occupying the region of the seventh, eighth, and ninth ribs, its longest diameter being on the eighth rib. Adherent to the skin and immovable on the ribs. Sharp limitation ; no infiltration ; no enlargement of the glands. There was evidence of apical consolidation.

Operation, December 12, 1887. Skin incision not mentioned. There was resection of the seventh, eighth, and ninth ribs in the extent of the tumor. The pleura was then opened, and the piece on which rested the base of the tumor was cut out ; the finger could feel a tumor the size of a pigeon's egg at the level of the eighth rib, nearer the vertebral column, projecting from the pleura inward. This was completely peeled out with the finger. The whole hand could now be put into the cavity. With the collapse of the lung a row of small tumors could be seen along the vertebral column. These, unfortunately, could not be removed. The pleura was sutured except at the posterior angle of the wound, where it was left open to the extent of 3 cm. for drainage. The external wound was closed except at the posterior angle. Moss pillow dressing.

Remarks : The opening of the pleura and the elimination of the right lung from the work of respiration gave rise to no disturbance of the narcosis. Naturally there was some dyspnœa after the patient awoke, but this was not particularly

marked. There was, above all, no noteworthy heart disturbance. The tumor showed itself microscopically a round-celled sarcoma; the intercostal nerves were embedded in the tumor, an explanation of the pains. The day after the operation the temperature was 38.9°, afterward normal. He left his bed December 24th for a little while, but feeling chilly and badly, after half an hour he lay down again. He had a restless night. Temperature next day was 39.3°, lasting several days. On January 13, 1888, he was discharged at his request, the temperature being normal. There were no signs, on examination, to explain the cause of the trouble. On December 25th the surgeon had thrust in his finger at the open angle of the wound, thinking there might be some retained fluid, but only a little bloody serum came. The wound was closed, and when discharged it was completely healed. At home the wound suppurated again a little, but was healed again in the beginning of February. Some days after this healing, during a spell of coughing which lasted a quarter of an hour, a quart of foul, stinking, yellowish-green pus came up. These attacks were subsequently repeated, with less discharge. This continued, getting less and less through March, April, May, and June. He got stronger and felt better.

In July, 1888, he remarked a tumor at the site of operation, and returned to Heineke's clinic July 16, 1888. The skin was observed to draw in during inspiration, and ballooned out as large as a child's head during expiration.

Diagnosis: Recurrence of sarcoma in the cicatrix, increasing apical consolidation, and hernia pulmonalis at the site of extirpation.

On July 18th the tumor was extirpated through an incision in the cicatrix, the pleura being again opened and closed with suture. Union by first intention. A piece of the herniated lung was removed at this operation.

Case XXV.

Müller's case, 1888, chondrosarcoma (Taken from Paget's *Surgery of the Chest*, p. 169. See also W. Müller, *Deutsche Zeitsch. f. klin. Chir.*, 1893, p. 41).

Paget does not include this in his table of cases, but gives it in full in the body of his work, p. 169.

A man, aged twenty-four years, in good general health, had a hard, rounded, flattened, shelving growth over the right ribs, from the fourth to the seventh, firmly united to them and extending from near the sternum to near the anterior axillary line. He had noted it four years. The veins over it were dilated, the skin was not adherent, the axillary glands were not enlarged. There was no dulness of the mediastinum, no displacement of the heart. Faint vesicular breathing was heard in the region of the growth; no râles; no friction sounds.

Operation, November 8, 1888: A large flap was raised, and it then could be made out that the intra-thoracic portion of the growth was much larger than the external swelling. Four inches of the fourth rib were removed, and then the fifth rib was similarly treated; at this moment the pleura, which was very thin, was torn, and air was heard entering the chest. Part of the sixth rib was now resected, pleura and all, and the tumor was raised, exposing a gap in the pleura as big as a saucer. At this moment the lung receded, and the growth went with it a little way back into the chest. Immediately the patient collapsed, his breathing stopped, his pulse could not be felt, injections of ether and camphor were given, and the danger passed off as soon as the growth was again grasped and drawn forward. It was now found to be firmly fixed by a broad base to the lower edge of the lung. The surgeon passed his finger over the lung and felt no other growths in it. His assistant then held the edge of the lung forward and kept it compressed while he transfixed and tied it, cut away the growth with scissors, and closed the wound in the lung with a continuous suture. He then let go the lung; it collapsed at once; again the patient became deadly pale, and gave no sign of pulse or respiration; he seized the lung and drew it forward, and again the patient revived. When, on tying his last skin suture, the surgeon had finally to let go the lung, the patient once more collapsed, and for some days

after he had slight dyspnœa. Three days after the operation six or seven ounces of serum were let out from the pleura. In March, 1891 (two and a half years later), a recurrent nodule beneath the scar was removed. A little air entered the pleura, but no harm came of it. In July, 1893, the patient was in perfect health. The growth was of a mixed character, mostly bone and cartilage at its centre, sarcoma at its exterior.

Case XXVI.

Hahn's case, 1888, myxochondro-sarcoma (*Deutsch. med. Woch.*, 1888, No. 50, p. 1034; also the same, 1889, p. 321).

Riesenfeld refers to this case as having been related the day after the operation, before the Berlin Medical Society. The patient seems to have been a colleague of the operator.

He was a man, aged thirty-three years. Had been previously operated on twice by Bruns in Tübingen—first in 1888 for a tumor of the ninth rib, the rib being resected. Four months later a recurrence called for resection of the eighth rib. When seen by Hahn, in 1888, the growth had attained the size of two fists, springing from the lower ribs. The patient urgently requested the operation. Hahn resected the sixth, seventh, eighth, ninth, and tenth ribs. When the tumor was drawn out the pleura and peritoneum were extensively opened, and a piece of the peritoneum the size of the palm of the hand was excised, being involved in the disease. The diaphragm was wounded and secured to the upper edge of the external wound. The condition the next day was relatively good, but he very soon succumbed to the operation.

Case XXVII.

Alsberg's first case, 1888, chondroma (Riesenfeld, in *Deutsch. med. Woch.*, 1889, p. 321).

This patient was a female, aged twenty-two years. Operated on, July 15, 1888. There was a tumor of slow growth; no pain; no marked impairment of health. It must have been first noticed in April, 1888, when it was of a walnut size. When operated on in July it was a tumor of the size

of a goose-egg, situated on the left side at the level of the seventh and eighth ribs, between the anterior and middle axillary lines. The skin was freely movable over the tumor. The tumor had a length of 9 cm. and a breadth of 6 cm. The eighth rib, which was surrounded by the growth, was resected and a piece of adherent pleura, two inches in size, cut out. The lung collapsed, but the patient quickly recovered and the pulse remained good throughout the operation. The wound was closed by deep and superficial sutures, with iodoform gauze drain at the lower end, which was later substituted by a rubber tube on the fourth day when the dressing was changed. The evening of the operation the patient complained of dyspnœa, which increased steadily, and was followed by a cough on the second day. On the evening of the third day temperature was 38.6°, pulse 140; but under treatment this was rapidly improved, and from the sixth day the pulse, temperature, and respiration were normal. Drainage tube was removed on the tenth day. In four weeks the patient left the hospital, being completely well and lung showing normal expansion. Microscopically it was an osteochondroma with myxomatous degeneration. According to Caro (*Deutsch. med. Woch.*, January, 1893, p. 57), there was no return up to January 19, 1890. Quénu and Longuet say none after five years.

Case XXVIII.

Roswell Park's case, 1888, sarcoma, spindle and round-celled (*Annals of Surgery*, 1888, viii. pp. 254-257).

F. C., aged thirty-three years, of Machias, N.Y. Patient's family history good. Twenty years ago noticed a nodule, no larger than a pea, about the middle of the outer aspect of the left leg, where he had previously bruised it. Enlarged slowly until five years ago, when it began growing rapidly. It was removed and diagnosticated sarcoma by the doctor. It returned at its old site. Early in February of 1887 he consulted me. I found a hard mass the size of a fist embedded in the tissues on the outside of the left leg, a little above the middle. Skin not much discolored nor very adherent. Larger now than

when first removed. I advised amputation. Dr. C. King, of Machias (who removed the first sarcoma), made it at the knee-joint; wound healed readily, with excellent resulting stump. A piece of growth sent me for examination proved to be a small, round-celled sarcoma.

By Dr. King's advice the patient returned to me in January, 1888. He presented a growth the size of a hen's egg a little above and to the outer side of the left nipple. It was fast, tender, but with movable overlying skin, apparently involving the whole thickness of the thoracic wall. Neighboring glands not involved. General condition good. Chest expansion normal, and on careful auscultation no difference detected between the sounds of the two lungs. No dulness on percussion in the neighborhood of the tumor. Main complaint, severe pain; also acknowledged he was losing a little flesh. I advised removal January 21, 1888, in my clinic at Buffalo General Hospital. Operation was made. Ether he took kindly. Skin over the tumor separated easily after a crucial incision had been made. It at once appeared that two, if not three, ribs were involved, and that total excision would be necessary. I began to separate periosteum on inner side of last rib involved, at short distance from edge of mass. Rib proved fragile, broke, and a spicule of bone forced through the pleura. As soon as the pleural cavity was opened I rapidly dilated the opening with my finger and determined that the growth was larger on the inner side of the thorax than on the outer; also, that there was adhesion in at least one place to the lung beneath. Having gone so far, I decided to extirpate the entire mass. I excised the tumor with the four ribs involved (fourth, fifth, sixth, and seventh), thus taking out a portion of the thoracic wall, some five inches in length by three and a half inches in width. After removing all the thoracic attachments I found that the band of adhesion connecting it with the lower border of the upper lobe of the lung was long enough to tie, and after throwing around it a strong ligature the mass was easily detached. During and after the removal a beautiful demon-

stration of the action of the heart in its pericardial sac was afforded. Hasty examination of the left lung, both ocular and by palpation, revealed numerous nodules scattered through the lung tissue of both lobes and on their surface. Had there been a single sarcomatous mass accessible I should have excised a portion of the lung. Under these circumstances such a measure was out of the question. Respiration but slightly disturbed. Pulse, however, became weak. Stimulants frequently given hypodermatically. I checked quickly what little hemorrhage there was and closed the wound with numerous continuous sutures. Over this iodoform was dusted and an antiseptic compress snugly bandaged down. At the close of the operation the face was slightly cyanosed, pulse 140, respiration 30 to the minute. Within an hour he was conscious, complained of great pain, checked by morphine subcutaneously given. During the ensuing night he was restless, requiring anodynes in large amounts. Pulse at one time 170, and very feeble. Following day temperature 97°, pulse 130, comparatively comfortable and taking sufficient nourishment. Next few days progressed very favorably, only once temperature as high as 101.1°, respiration fluctuated between 30 and 50 for two or three days. His left lung seemed to be inflated. January 27th, his face was cyanosed and anxious, respiratory murmur on left side lost; the vesicular character, which for three days it had had, became faint. Dressing had not been changed at all. Toward evening became delirious and died early the following morning. Five hours later I reopened the wound, which I found completely united by first intention. Cavity of the left pleura filled with a bloody serum, in which the lung seemed to have macerated, since it was soft and tore easily. Fluid had no odor. Hand passed into right pleural cavity; found right lung just as much studded with sarcomatous nodules as left.

Comments: Equal affections of the two lungs will account for the fact that on auscultation no difference was detected. Microscopical examination showed it to be a small spindle-

celled sarcoma, while the nodules found in the lungs showed distinct sarcomatous elements, but of round-cells. It is of pathological interest to note how secondary growths differ from the parent tumor.

Case XXIX.

Tietze's third case, 1889, sarcoma (Reported from Fischer's surgical clinic in Breslau, *Deutsch. Zeitsch. f. Chir.*, 1891, Band xxxii. p. 424).

A. G., aged twenty-eight years, wife of a harness-maker. Family history good. Menstruated at sixteen. At the age of nineteen, while dancing, received a blow on the left breast, and had pain for some days. A hard lump developed on the outer side of the left mamma, about the size of a walnut. At twenty-two she married, the lump being present, but causing no inconvenience. During her first pregnancy, in the second year of her married life, the lump became larger. She was twice pregnant afterward. The tumor became larger during lactation. During last pregnancy (the fourth), the tumor attained the size of a man's fist, and increased rapidly in size during lactation with marked pain, which necessitated weaning.

She presented herself at the surgical clinic August 12, 1889.

Examination: No enlarged axillary glands. Dimensions of tumor: length, 11 cm.; breadth, 15 cm.; height, 12 cm.

Operation: Circular incision extending toward axilla, exposure of capsule, which was easily separated from the flaps. Tumor seemed to originate from the chest wall, extending toward the sternum and thence to the cartilage of the fifth rib. The adjacent ribs were separated so that the tumor seemed to be surrounded by a bony ring. The fifth rib being cut and the tumor being lifted, there were found both pericardial and pleural adhesions. The pericardial adhesions offered no difficulty, but in separating the pleura from the tumor this membrane was torn in several places, and during the manipulation the severed rib broke, permitting the entire removal of the tumor. The larger portion of the pericardium was now to

be seen. When the pleura was torn the lung collapsed. The pleural rents were sewed up, but the sutures partly cut out, giving rise to some emphysema, which was controlled by a rather stout bandage. There was no material change of pulse while the pleura was open. The blood loss was small. The general condition of the patient after the operation was good, the pulse being moderate and strong.

For the first two days the dyspnœa was noticeable. The temperature on the evening of the operation was 37.8°, second evening 38.4°, the highest point reached. Sixth day, change of bandage, removal of iodoform gauze and sutures, the wound being healed primarily. The patient was dismissed on the fourteenth day, after the second change of bandage.

She did not report again until January, 1890. She seemed in perfect health. The thoracic defect measured from the fourth to the sixth ribs 5 cm. in length by 10 cm. in breadth. The heart pulsation could be plainly seen and the apex readily palpated with the fingers. The lung seemed to be functioning normally. Her household duties did not permit her remaining long enough for more extended examination. Up to the time of this report (1891) the woman had not reported since 1890. Quénu and Longuet say no recurrence after three years, but their reference is the same as mine. I think it should be one year, as she had not reported since 1890.

Case XXX.

First case of Vautrin, 1889, sarcoma (*Huitième Congrès de Chir.*, Lyon, 1894).

Mlle. X., of Thiancourt, aged nineteen years, entered the hospital September, 1889, to be operated on for a voluminous tumor of the breast, which had been observed only six months.

Of sound parents and in perfect health until the last few months, she is now pale, anæmic, her appearance one of suffering. All these altered traits, combined with her red hair, indicated a nature delicate and without resistance.

The right breast was infiltrated by an enormous neoplastic

mass, extending from the sternal line to the axillary border of the scapula, and from the clavicle to the last ribs. Skin wrinkled, veins dilated, distended, and glistening; the nipple umbilicated. She complained of great pain in the right arm. Impossible to mobilize the tumor or its attachments. Auscultation and percussion denoted no intrathoracic invasion.

His diagnosis was encephaloid sarcoma of the breast of rapid progress, with adhesion to ribs and also spreading in the intercostal spaces.

The operation was done September 17, 1889. Vautrin made an elliptical incision around the principal part of the tumor, whose limits were uncertain. He dissected away the skin and laid bare the deep layers, more or less invaded, and arrived at the neoplasm, which absorbed all the mammary gland and pushed out feelers even into the muscles toward the axilla and under the pectorals. He commenced the dissection at the base of the tumor toward the sternum, where there were solid adherences with the ribs. He cut with a bistoury the cartilages of five successive ribs, then exposed the pleura on their internal surface; but at 7 cm. from the sternum he arrived at a place where this membrane was absorbed by the tumor. Here two rarefied ribs broke. Light tractions on the tumor tore the pleura, and air entered the chest. Several successive syncopes followed, and the chloroform was stopped and two injections of ether given. After five minutes pulse was improved, respiration became more frequent, but regular, and the operation was continued.

The pleura was opened, pneumothorax was established, and the lung was collapsed against the vertebral groove. A piece of diseased pleura 8 cm. wide by 6 cm. in length was removed. The fourth, fifth, sixth, and seventh ribs were cut back of the vertical axillary line at the angles of the ribs. The ablation of the inferior fibres of the great pectoral muscle and a part of the minor was done, and as the third rib was already adherent and diseased it was resected to the extent of a five-cent piece. The arm-pit was cleaned to the axillary vein and quite a large neoplastic node removed. The external digitations of

the serratus magnus and the external border of the latissimus were found absorbed by the neoplasm, and Vautrin abraded them. The wound was enormous, measuring 25 cm. in its transverse diameter, and extending vertically from a point situated 3 cm. from the clavicle to the eighth rib. In the midst was the pleural opening, through which could be seen the retracted lung. The toilet of the pleural cul-de-sac was made by wiping with sterile compresses, without irrigation. It was useless to try to close the pleural opening by approximation, the loss of substance being too great. Passed a drain from the bottom of the pleural cavity toward the posterior costo-diaphragmatic angle across the thoracic wall, behind and internally to the angles of the ribs. The difficulty now was to close this immense wound. The flaps of skin and subcutaneous tissue, carefully husbanded during the operation, served partly, but had to be supplemented by a flap taken from behind the wound and from the axilla, and with a pedicle large enough to insure its vitality. The wound was united with silkworm-gut, leaving an opening 5 cm. in diameter. The operation lasted one hour and a half.

For two days she had attacks of vomiting and dyspnœa. The pulse remained regular at 100. The temperature rose the second day to 38.5°, and oscillated between 38° and 39° for about a week. About the third day the right lung commenced to respire in its whole extent, and by the fifth its rhythm was normal. The drain discharged at first a suspicious serum, then frank pus.

It is to be noted that the patient complained during eight or ten days of an intense pleuritic stitch, but at no time was the situation grave. About the fifteenth day she could sit up, and on the twenty-fifth the posterior drain was removed. The cicatrization was complete about the fortieth day, when the photographs were taken. It was observed that the lung was intimately adherent to the whole extent of the cicatrix, the sucking-in of which toward the cavity was easily seen during the respiratory movements.

The patient left the hospital about the fiftieth day, thor-

oughly well. Quénu and Longuet report no recurrence after five years.

Case XXXI.

Bardeleben's case, 1890, sarcoma (H. Plitt, *Inaug. Diss.*, Berlin, 1890).

Wilhelm S., aged thirty-eight years, admitted into Charité, Berlin, January 20, 1890.

Family history good. January, 1889, he fell on the ice and struck heavily on the left side. A carpenter's rule in his pocket produced a severe bruise at the lower part of the chest on the left side. Three days afterward there was a swelling extending from the sixth to the ninth ribs on the left side. This increased in size, accompanied by severe pains. Six weeks before admission he noticed several little lumps over this region, extending up toward the shoulder. The patient is a moderately strong man, somewhat meagre. He had suffered considerably, and lost much rest at night in consequence.

Examination: Left side distinctly bulging below between the mammary gland and the mid-axillary line. The skin was practically uninvolved and quite movable. A row of tolerably hard tumors, arranged in oblique direction from below and behind, forward and upward, was seen, the lowest of these on the ninth rib in the midaxillary line, the highest close to the mammary line at the sixth rib. The lowest of them was of a walnut size, the highest bean size. It was difficult to say whether the soft parts or the bony were involved. The seventh and eighth intercostal spaces were covered by the tumor. The upper edge of the seventh and the lower edge of the ninth ribs were easily felt, as well as the spaces above the seventh and below the ninth. The measurement of the tumor on the eighth rib was 13 cm. The distance from the xiphoid process to the point of the first lumbar spine was three and one-half inches greater on this side.

Operation January 25, 1890. The first oblique row of small nodules was taken out with a part of the latissimus dorsi. The ninth rib was then resected, and then the seventh and eighth. In resecting the seventh and eighth a piece of

the pleura had to be removed, being involved in the disease. Then the soft parts of the sixth and ninth intercostal spaces were cut through. The ribs were first cut through in front and then behind. Through this wound the lung, adherent to the diaphragm, could be seen moving up and down, as, likewise, the heart and the diaphragm. The left kidney even could be seen glistening through the diaphanous diaphragm. Further inspection showed that more of the eighth rib was diseased, so that one and one-half inches more were removed. The operation lasted ninety minutes. Nothing alarming occurred—only the rush of air and temporary fall of the pulse. A large drain was put in and the wound sutured. The dressing was changed on the fourth day, again on the sixth, when a new drain was put in, and on the eleventh the drain was removed. Since February 12th the patient has been getting occasionally out of bed, and on February 22d he was dismissed at his request, the wound being healed.

March 3*d*. The patient returned to have some glands in the left axilla removed. These were as large as a goose-egg. They were taken out, and healing promptly followed.

12*th*. In the supraclavicular space a new glandular swelling was discovered. This was removed, as well as three small glands discovered lying on the subclavian artery.

22*d*. The patient was discharged.

Examination of the tumor showed it to be alveolar sarcoma of the eighth rib. Horizontal measure, 13 cm.; vertical, 7 cm. The eighth rib showed fracture. Five months later the patient was again seen and was completely well.

Case XXXII.

Case of O. Witzel, 1890, sarcoma (*Centralbl. f. Chir.*, 1890, xvii. 523. "Ein Verfahren zur Beseitigung des akuten nach Penetratio der Brustwand entstandenen Pneumothorax").

Male, aged thirty years, no further information given, except that the tumor was of the size of the fist and situated over the tenth and eleventh ribs of the right side.

The operation was done by Witzel about Easter, 1890. Under morphine-chloroform narcosis a U-shaped flap was made, exposing the tumor. The tenth and eleventh ribs were divided and the pleura opened with the scissors after cutting through the intercostal musculature. It was necessary to remove the posterior remnants of the ribs as well as the transverse processes of the vertebræ corresponding to the resected ribs. The pleura being opened, cyanosis appeared with dyspnœa, at first of high degree, but improving in two or three minutes, whereupon the fluttering lung slightly expanded. The heart here as well as in another earlier case of Witzel's (*vide* Case XIX.) suffered out of proportion to the respiration. Witzel attributed it to the flexion of the large vessels, due to the sudden dislodgement of the heart. This, according to Witzel, occurs toward the side of operation when the pleura is freely opened, but toward the opposite side in closed pneumothorax.

In this case the pneumothorax was overcome by a simple method. The cavity was filled with warm boric solution, thus converting the pneumothorax into a hydrothorax. A male catheter attached to an irrigator was introduced into the upper anterior end of the outer wound so that it ran parallel with the wall of the thorax. The outer wound, particularly around the instrument, was now closed with deep and superficial sutures, so as to be air-tight and water-tight, excepting a small slit at the apex of the pleural cavity. Across this slit sutures were passed, ready to be drawn tight later on. The pleura was now filled from the irrigator through the catheter with warm boric solution at blood temperature.

When no more air, even on gentle shaking of the patient, issued from the slit, this slit was closed by tying the sutures. Slight and very transitory cyanosis followed the introduction of the solution. By lowering the irrigator the fluid at once began to flow from the catheter, and as it flowed the respiration and the heart's action improved. The fluid being drawn, the catheter was withdrawn in such a way as to prevent the entrance of air.

The results of the operation exceeded expectations. The patient being raised, at once breathed quietly and easily. Percussion and auscultation showed the lung to be expanding even where the resection had taken place. Only posteriorly was a slight friction heard, supposed to be due to blood clots.

The course of healing was uninterrupted. There was for a time a short fistula due to a ligature, and behind there was a slight dulness along the lower part of the thorax, indicating adhesion.

Second case of Witzel, referred to in this article.

This is evidently the same as Trendelenburg's (see Case XIX.), and is, therefore, thrown out. Quénu and Longuet give a second case of Witzel, but the only authority for it is Witzel's article; but a careful study of this paper in conjunction with the *Inaug. Dissertation* of Baldus, Bonn, 1887, to which Witzel refers for a fuller account of the case, shows conclusively that he speaks of Trendelenburg's case (Case XIX. in this list). This second case of Witzel (Case XIV., Class B, in Quénu and Longuet) is, therefore, thrown out. The case is not found in the list of Gerulanos nor in that of Paget, but, however, given as Trendelenburg's.

Case XXXIII.

Case of Marsh, 1890, chondroma (*British Medical Journal*, June 14, 1890).

F. W., aged twenty years, delicate looking woman, having a good family history, was admitted to Queen's Hospital, Birmingham, March 19, 1890. For many years has had double suppurative otitis media, a sequel of measles, but with this exception has had good health. Her work (brushmaker) involves a considerable use of the shoulder by the pectoral muscles.

Two years ago noticed accidentally a lump on her chest, just above the right breast. It felt hard, but not painful. It has slowly increased in size until a few months ago, has grown more rapidly since, and as it is becoming a deformity she wishes something done. Growth now measures about three

inches in its long diameter, is irregularly oval in shape, hard, slightly lobulated, painless, situated over the sternal ends of the third and fourth ribs and firmly attached to one of them, the skin over it being normal and movable. Under an anæsthetic, growth was exposed by oblique incision; soft tissues easily separated from it, and the projecting part cut off with chisel and mallet. Proved to be an enchondroma; hard externally, but of a crumbly consistence underneath, attached to the third rib, a portion still being left wedged tightly in the third interspace, pressing the fourth rib downward. On removing this with a gouge it was seen that the growth expanded beneath the ribs into a mass of the size of one's fist. Owing to crumbling consistence and want of support, could only be removed piecemeal. The portion of the rib from which the growth originated was cut away, and so, then, was the capsule, which was so blended with the stretched pleura that it was necessary to excise the implicated piece, measuring three inches by three inches. There was now an opening of irregular shape in the chest-wall. Each bleeding point had been at once secured. The pale, salmon-colored lung, covered only by visceral pleura, could be distinctly seen. The exposed lung moved synchronously with each movement of inspiration and expiration, forward and backward, to and from the anterior chest-wall, rather than upward and downward, through a space of fully three inches. The amount of the movement varied with the length and the depth of the respiration, from one inch to contact with the chest-wall—in fact, great care had to be exercised to avoid including the lung in the sutures closing the wound. These physiological facts I leave to physiologists to explain.

It was impossible to bring the edges of the parietal pleura together, so I sutured the soft parts together over the openings, placing a short, good-sized rubber drainage-tube in the lower angle, anticipating there would be some pleuritic effusion. Patient fairly comfortable, though temperature kept at 100° F. for forty-eight hours. Dressings were now changed, and as they were dry and the percussion-note over the base

was that of pneumothorax, I directed the patient to inspire deeply, to empty the pleural cavity as much as possible of air, and at the height of the inspiration I withdrew the tube and closed the wound with a strapping. Patient more comfortable after removing the tube; temperature fell to normal; wound healed by first intention. The slight pneumothorax disappeared. Patient shown at Midland Medical Society on April 23d. Percussion sounds everywhere normal and clear.

Case XXXIV.

Alsberg's second case, 1891, sarcoma, round-celled and spindle-celled (From Caro, *Deutsche med. Woch.*, January, 1893, No. 3, p. 57).

Female, aged thirty-one years. She sprang from healthy parents and had never been sick before. In July she felt tearing pains in the right arm. These increased and kept her from her work. At the end of July she noticed in the right side above and anteriorly a tumor, which slowly but steadily grew. The pain forced her to apply to the hospital in Hamburg in the latter part of September. She was a woman above middle size, with large bones and well developed musculature. She had the appearance of suffering. The tumor, of a fist size, occupied the space between the clavicle and the fourth rib, and extended from the right parasternal line to the anterior axillary line. There was tolerably sharp limitation. The skin was red from repeated rubbing. The tumor, which was elastic, was firmly fixed to the ribs. There was no infiltration and no glandular involvement. Puncture brought only blood. The chest and upper organs healthy.

Operation on September 21, 1891. Alsberg operated. Made transverse incision through the skin and muscles. The tumor was found to lie directly on the pleura, in the second intercostal space. A second incision was made toward the axilla, and the base of the tumor separated from the pleura without opening it. The tumor ruptured during the manipulation. Seven cm. of the second rib was resected. In taking away the tissues of the second intercostal space a piece of the

pleura about the size of a five-mark piece had to be cut out. The wound was immediately stuffed with iodoform gauze; the wound was finally closed by suture, a gauze drain having been put in. The narcosis was not disturbed by the temporary elimination of the right lung from the respiratory work. Toward evening the respirations were 48, pulse 90, temperature 38.7°. She had a bad night.

September 23*d*. Pulse was 120 and the patient seemed very ill; dressing was changed; hæmatothorax; six to eight tablespoonfuls of bloody serum drained out from the wound. For some days the bad symptoms continued.

28*th*. The wound looked well and the patient seemed better.

30*th*. She was out of bed, and on October 4th discharged. The tumor was a round-celled and spindle-celled sarcoma.

November 6, 1892. The patient died of inoperable recurrence after small operations had already been done in March, May, and June previously for recurrence beginning one month after first operation.

Case XXXV.

Case of Mikulicz, 1891, myxochondro-sarcoma cysticum (Reported by v. Noorden, *Deutsche med. Woch.*, 1893, xix, 346).

A man, aged fifty-four years. There was no hereditary history and no history of injury. Four years before a tumor of the size of a hen's egg was observed in the left anterior axillary line, about the seventh rib. This grew slowly for a long time and then more rapidly.

Examination, June 25, 1891. The tumor was pear-shaped; the circumference at the base was 78 cm.; vertical measurement 35 cm.; antero-posterior 26 cm. Reaches from the axilla to the bottom of the thorax, spreading forward under the nipple beyond the anterior axillary line, backward under the inferior axillary angle of the scapula to the external edge of the latissimus dorsi, and approaches posteriorly to within 1 cm. of the crest of the ilium. The shoulder blade was pushed slightly upward, but movable. The following regions were occupied by the tumor: the axilla of the left

side, the lateral chest wall, the hypochondriac and mammary regions, and the region of the back lying beneath the scapula. The adduction of the upper extremity was diminished by the presence of the tumor. The skin over the tumor was movable, and there was nothing abnormal in the chest or abdomen. There was no sugar in the urine, no albumin, no indican, but abundant sedimentum lateritium. The hæmoglobin mounted up to 85 (v. Fleischl). Absolutely nothing else abnormal anywhere.

Diagnosis rested upon the historical data, the local and general condition, and upon the examination of a piece of the tumor excised for the purpose. (This, if enchondroma, would not invariably show the character of the tumor.) The situation, duration, the insignificant influence on the health, the absence of lymphatic glandular involvement, the extension of the tumor, the absence of skin infiltration implied chondroma, but always with the reservation that a malignant change, suspected from recent rapid growth, might have supervened to invalidate the diagnosis. A valuable wrinkle was furnished by the blood examination. The amount of hæmoglobin contents of 80 to 90, before the operation, corresponds, according to his frequently made observation, to no malignant tumor; and it has been established by many experiences in his clinic that the return of the hæmoglobin to the original amount meant that no recurrence had taken place, or, at least, none of malignant nature. The operation was done under morphine-chloroform narcosis, and lasted three-quarters of an hour. The patient was laid on the right side (opposite), and the operation was done in two stages. Incision was vertical. The involved diaphragm was cut off last, leaving an opening of antero-posterior measurement of 8 cm., being 9 cm. wide. The wound in the diaphragm was closed, partly by the muscles, especially the abdominal oblique muscles, and partly by direct suture. Some small tumors were found toward the vertebral column. The wound in the wall was enlarged, and the tumors removed with hammer, chisel, shears, and forceps. In this operation the seventh,

eighth, ninth, and tenth ribs were resected. A large piece of the pleura was taken away, and a piece of the diaphragm, as before stated. There was no change in the pulse or respiration when the pleura was opened.

On the eighth day there were respiratory difficulties. Then percussion showed dulness up to the middle of the scapula. Punctures in the posterior axillary line brought one and one-half quarts of bloody fluid. Stitches were removed in fourteen days. He was discharged in five weeks, and went to work. Nearly a year afterward some small tumors were found near the lower end of the incision. These were subcutaneous, and were easily removed.

After fourteen months an examination showed sinking in of the thorax over the site of the defect; clear percussion to the ninth rib; vesicular breathing everywhere. Bulging out of the wall in the defect took place in expiration to the size of a fist. No recurrence is mentioned.

Case XXXVI.

König's third case, 1891, sarcoma (round-celled). (Paget's *Surgery of the Chest*, p. 180, case 21.)

This was operated on in 1891. A man, aged thirty-four years. Noted only six weeks; not painful; says he had a cough and was losing flesh. Looks thin, pale, and feeble. A firm, elastic growth, the size of a large apple, was situated over the seventh rib, in the axillary line. There was no fluctuation. Tumor was an alveolar round-celled sarcoma. The seventh rib was resected with adherent pleura; lung was found fixed by old adhesion of the upper lobe; there was no serious dyspnœa either during or after the operation. He recovered slowly from the operation, but there was rapid recurrence, which ended in death.

Case XXXVII.

Vautrin's second case, 1891, carcinoma (secondary to mammary carcinoma). (*Huitième Congrès de Chirurgie*, 1894, p. 162.)

This was a woman, aged forty-six years, housekeeper, of

excellent previous health, and the mother of several children. Vautrin had operated on her in October, 1890, for carcinoma of the right mammary gland. The axilla had been cleaned out and the aponeurosis of the great pectoral removed. Six months later there was recurrence, but she came to Vautrin only in December, 1891—that is, at least four months after the recurrence first manifested itself. The neoplasm was seated on the anterior aspect of the thorax, at the level of the old cicatrix, which was ulcerated in the region lying between the sternal and axillary lines. Adhesion between the tumor and the ribs was quite firm. There was no implication of the lung or bones by metastases, and there was no cachexia.

Operation: Circular incision about the tumor, excision of a considerable part of the great pectoral in the neighborhood; resection of 7 cm. of the fifth and sixth ribs, beneath which the pleura was found adherent and diseased. The fourth and fifth ribs being also removed to the extent of 4 or 5 cm. and the hæmostasis being attended to, the pleura was opened, the chloroform being suspended. The air rushed in, the lung collapsed, continuing, however, after a fashion, to perform its functions; then the respiration became irregular, and the pulse weak, recovering itself intermittingly. Soon the heart and respiration became regular, and the pleural flap invaded by the disease was cut away. The pleural opening measured 3½ cm. in diameter, and through it the healthy lung could be seen to fall back against the vertebral groove. It was impossible to unite the edges of the pleural wound, so he conceived the idea of attaching the parietal to the visceral pleura. The lung was seized with a pair of forceps, but, being caught too near the hilus, it could not be sufficiently mobilized to bring it into the opening. He made another attempt, catching the lung farther out, but again the required traction was too great. Finally, Vautrin enlarged the wound in the wall by a further resection sufficient to enable him to detach the pleura and sink it in until it could be sutured to the visceral pleura. The wound in the thoracic wall was thus filled in. He was

much bothered by the resulting funnel-shaped wound, which the lung traction exaggerated in depth and which the absence of soft parts prevented him from filling in. The exposed surface was diminished as far as possible, but he was forced to leave uncovered the infundibulum formed by the visceral pleura at the bottom and the external surface of the parietal pleura all around.

On the third day, on removing the dressing, he was reassured. The lung had resumed its function, the pneumothorax had in a large part disappeared, and the air, filling out the alveoli of the lung, had caused the infundibulum, which had existed two days before, to become obliterated. The bottom of the wound gradually approached the level of the resected ribs.

The cicatrization was completed in two months, and the woman resumed her occupation. Four months after this—that is, six months after the intervention—a new recurrence was discovered in the skin near the sternum, but the woman declined to submit to any further operation.

Case XXXVIII.

Case of Zarubin, 1891, sarcoma (Jacobson's *Operations of Surgery*, 1897, p. 581).

Zarubin, of Kharkov, relates (*Transactions of the Kharkov University Society*, 1891, supplement to *British Medical Journal*, August 1, 1891) the case of a young Cossack, who sought his advice for a steadily growing and occasionally painful tumor of seven years' standing. It measured 21 cm. horizontally and 19 cm. vertically, occupying the right side of the chest between the nipple and the post-axillary line from the sixth to the ninth rib. The new growth was hard, nodulated, immovable, and non-adherent to the skin. The integuments over it were thinned, but otherwise normal, and the nearest lymphatic glands apparently unaffected. An osteochondroma of the thoracic wall was diagnosticated. The huge mass was removed, together with the involved portions of the seventh, eighth, and ninth ribs. The gap left in the chest measured

17 cm. in a horizontal and 16 cm. in a vertical direction. On opening the thoracic cavity the lung collapsed, but only partially, owing to pleural adhesions around the periphery of the new growths. No serious respiratory or cardiac disturbances occurred, and the hemorrhage was trifling. The cavity was gently cleansed with gauze, soaked in a 1 per cent. solution of boric acid, and the skin wound, conical in shape, closed. The growth was much larger than an adult's head, and weighed six pounds. For the first two days the patient was much collapsed and cyanosed, and suffered from agonizing cough and obstinate vomiting.

A long drainage-tube was inserted and the crucial-shaped wound closed with silk sutures. Pus escaped from the tube for eight weeks. On the sixty-first day the tube was removed and the wound healed up. On the one hundredth day the man was discharged with an appropriate pad over the deep depression.

Case XXXIX.

König's fifth case, 1893, chondroma cysticum (From Paget's *Surgery of the Chest*, Case No. 23, p. 180).

This was operated on in 1893. A man, fifty-five years of age. Noted six or seven years before; gradual in its development; for the last year rapid, and painful on coughing. The growth was firm and hard, but fluctuating over its lower aspect. It was situated below the right nipple over the fourth to the seventh ribs. It was a cystic chondroma. The fifth and sixth ribs were resected subperiosteally. The pleura was opened. The lung collapsed. The wound in the pleura was sutured save for a hole for drainage. There was intense shock. Death a few hours after the operation. At the post-mortem examination half a pint of blood was found in the cavity. There were chronic degenerative changes in the heart and the lungs.

Case XL.

König's sixth case, 1893, chondroma cysticum (From Paget's *Surgery of the Chest*, p. 170).

A man, aged twenty-nine years, in good general health, had for ten years noted a growth on his right side in front of the shoulder. It had of late increased rapidly. Its lower part had become soft, and had been punctured and fluid had been drawn off. It now extended from the second rib down to the nipple; passed forward an inch beyond the middle line and backward to the posterior axillary line. It was nodular, hard as cartilage, fluctuating on its lower aspects, and almost as large as a child's head.

Operation April 26, 1893: A large flap was raised, including part of the pectoral muscle. The third rib was cut through and the growth was cleared with the finger and raised. It was found easier than had been expected to strip the pleura off it, except over its lower posterior aspect, where growth, pleura, and lung were all adherent together. At this point a piece of the pleura and a small piece of the lung were removed with scissors. Little blood was lost; pulse and breathing remained good. The day after the operation he had a good deal of dyspnœa; some suppuration occurred; he made a good recovery. The growth was cartilaginous, with cystic degeneration.

(This case is found in Paget's text, but is not included in his tables.)

Case XLI.

Sheild's case, 1894, sarcoma of venter of the scapula and ribs (*Lancet*, London, 1894, p. 741).

Boy, aged ten years, sent to Mr. Sheild by Mr. Little.

One of seven children, three of whom are still living. Of the four dead, one died of tumor on the brain, one from "water on the brain," one was born dead, and one seemed to have been under term and lived only one week. The father is living and healthy; the mother is also a fairly healthy woman. No history of tuberculosis in any branch of the family.

About twelve or fifteen months ago his mother noticed a lump in the right arm-pit, and so took him to the Royal Free Hospital.

When seen by Mr. Sheild there was found in the axilla a

rounded, fixed mass the size of an orange, pushing up the shoulder and obviously compressing the axillary nerves. It was exceedingly difficult to make out whether or not the tumor moved with the scapula, but it appeared to do so slightly. The skin over the tumor was not inflamed and not adherent. There was no tenderness except on firm manipulation. The measurements of the tumor, taken with the arm abducted as far as it would go, were: From above downward two and one-half inches, and from before backward two inches. From in front there appeared to be marked wasting of the right pectoral muscles, and the deltoid was likewise much wasted, the head of the right humerus and the acromion being much more prominent. The right shoulder was held about one inch higher than the left, and the head was kept slightly bent to the right. The anterior edge of the trapezius was more prominent than the left. With the arms held to the side the tumor was slightly visible, but when abducted the tumor was very evident. From behind the right supra-spinatus and infra-spinatus muscles were considerably atrophied, and the tumor was perfectly evident with the arm hanging by the side, forming quite a bulge along the axillary border of the scapula. There was well marked curvature of the spine in the dorsal region, the convexity being to the left, so that the inferior angle of the scapula stood out prominently. The right shoulder measured one inch more than the left in circumference, but the arm and forearm were more wasted than the left. The movements of the right shoulder were much restricted.

The gravity of the case was fully explained to the parents, who, nevertheless, desired that the operation be performed. Accordingly it was undertaken by Mr. Shield on August 13th. The A. C. E. mixture was used. An incision was first made into the axilla to define the limits of the tumor. It was now quite evident that the tumor was of scapular origin, but the finger could not pass between the growth and thoracic parietes toward the apex of the axilla. On moving the arm and scapula the tumor moved slightly also, and the opinion was formed—erroneously, as it proved—that if the

scapula was removed the tumor would come away with it, leaving the thoracic parietes intact. Accordingly two very free incisions were made posteriorly—one from the superior to the inferior angle of the scapula, the other almost at right angles to this. The muscles at the vertebral border were divided; next those at the superior border and angle; the acromion was divided and the shoulder-joint freely opened. The amount of blood lost was quite inconsiderable. The axillary border was next attacked, and, as the bone could now be separated from the chest, it became evident that the subscapularis and teres muscles no longer existed as such, but were incorporated in the tumor mass, the growth, firm and fibrous, entirely infiltrating their substance. It was also ascertained that the tumor projected markedly toward the thorax on the upper aspect of the inner axillary wall, and the intercostals and serratus magnus were implicated in the growth. Seeing the hopeless nature of the case if abandoned, an attempt was made to peel away the intercostals and pleura from the tumor, but this was quite impossible, and in attempting it the thoracic cavity was opened, and the finger could plainly feel the growth projecting upward against the ribs and lung, though, of course, covered by the firmly adherent pleura. Under such desperate circumstances the parts were readjusted and the wound dressed antiseptically. Obvious pneumothorax existed, and the heart became displaced, but there were no signs of shock. The boy died on the following day.

The autopsy showed the lung collapsed, with pleura non-adherent. The first and second ribs were firmly incorporated with the tumor. The growth appeared to have originated in the subscapularis, and, though it apparently sprang from the scapula, this was really not the case. The whole subscapularis was practically a sarcoma, and the growth had in like manner invaded the teres and serratus magnus and the intercostals. At the upper limit the main vessels and nerves passed through its substance and were incorporated with it. Mr. Targett, of the Royal College of Surgeons, of England, further examined the tumor and found the bone full of it.

The microscope showed it to be a dense spindle-celled sarcoma, approaching to fibroma in some parts.

Case XLII.

Case of J. L. Faure, 1895, sarcoma (*Revue de Chirurgie*, May 10, 1898, p. 402. Quénu and Longuet's article).

Man, aged sixty-one (in Quénu and Longuet's table, p. 399, the age is given as twenty-one), years old. Admitted to Bicêtre in 1895.

In 1885 he suffered a fracture of the rib at the same place. The tumor began eighteen months ago. Loss of flesh and progressive cachexia.

On the right side, at the level of the last ribs in the dorso-lateral region, at 10 cm. distance from the vertebral column, was a tumor the size of the fist, elongated, about 12 cm. in diameter, hard, immobile, and difficult of limitation. The skin was movable; deep attachments evident.

Operation August 9, 1895, under chloroform. The tumor was reached as soon as the skin was incised. There were prolongations on all sides in the substance of the sacro-lumbalis and the antero-lateral muscles. It was impossible to think of raising it *en bloc*. It was extirpated *par morcellement*. While circumscribing a node as large as a walnut, projecting into the depths, the pleura was torn for about 2 cm. at the level of the costo-diaphragmatic cul-de-sac. The air went in and out of the wound. This rent was rapidly obliterated by a whip-stitch of catgut. The hemorrhage was considerable, blood flowing from all sides, perceptibly weakening the patient. Although some masses of tumor still remained, the wound was tamponed with iodoform gauze and sutured.

In spite of a deplorable general condition, after some days of extreme debility, the patient got better. The wound granulated and gradually contracted. The appetite returned after some time, and the patient got up.

November 10th. The wound is nearly healed, and the general condition relatively good, although it is evident that the tumor continues its evolution.

Case XLIII.

Karewski's case, 1895, sarcoma. *Soc. med.*, Berlin, January 29, 1896 (quoted by Quénu and Longuet.) *Deutsche med. Woch.*, 1896, No. 14 (quoted by Gerulanos.)

Quénu and Longuet tabulate this among operations of the first class in which the pleura was not opened. They remark that there were two extirpations, but only mention of the second operation that three ribs were resected. They give the date of operation as 1895, which evidently refers to the first operation, although no particulars of this are given. The patient was a man, but the age is not given.

This is undoubtedly the same case as that found in the table of Gerulanos, who classes it under the head of intrapleural or penetrating operations. He gives the date as 1896, and is evidently describing the second operation.

The patient was a man, aged thirty-six years, who had three walnut-sized tumors (sarcomas), situated in the axillary line of the right side. The sixth, seventh, and eighth ribs were resected with a piece of the pleura corresponding. When the pleura was opened there was great paleness, and the pulse became imperceptible. The man, however, recovered. Gerulanos says nothing of the final result, but Quénu and Longuet add a note to the effect that death took place with metastasis in the neck.

As I have been unable to consult the original (Karewski, *Deutsche med. Woch.*, 1896, No. 14), I have thus compared the data derived from these secondary sources and classed the case in the second group, the penetrating or intrapleural operations.

Case XLIV.

Quénu's case, 1895, chondroma (*Revue de Chirurgie*, May 10, 1898, xv. p. 396).

Man, aged forty-nine years. The tumor was situated on the left side and extended from the fifth to the ninth rib, and from the left parasternal line to the posterior axillary line. The tumor had grown slowly for ten years, then quite

brusquely, with pains. In the operation the fourth, fifth, and sixth ribs were cut through, first in front of, then behind, the tumor, and the tumor removed with the ribs. There were two wounds of the pleura. There was at once cyanosis, apnœa, asphyxia, and fall of the pulse. The operation had to be finished very hurriedly. The respiration became regular again only after obturation of the wound. Death occurred on the fourth day of dyspnœa and collapse.

Quénu, in this case (*loc. cit.*, p. 382), tried the effect of artificial respiration, but without much effect, the conditions improving only after the suturing of the skin prevented any further access of air to the pleura. The patient never recovered from the collapse.

Case XLV.

Dennis's case, 1896, sarcoma (Park's *Surgery by American Authors*, 1896, vol. ii.; article by Dennis, p. 293).

"The writer has recently operated on a case of sarcoma which was situated upon the axillary aspect of the chest. The patient was fifteen years of age, and was struck over the site of the tumor by a base-ball. Three months later a well-defined, hard tumor was present, with firm adhesion to the rib. The tumor was removed, together with rib to which it was attached, and also the underlying pleura, which was also involved. The lung itself was not implicated in the growth."

The illustration (Fig. 128, p. 292, *loc. cit.*) shows a tumor lying obliquely across the right side of the chest, running apparently from the parasternal line near the junction of the ensiform cartilage with the second piece of the sternum, upward to the axillary line to a point above the nipple. Although it is stated in the above brief reference that the pleura was opened, nothing is said regarding the occurrence of pneumothorax, and no mention is made of the result, either immediate or remote. It is to be presumed, however, that the boy recovered, as the case seemed to be a perfectly simple one in a young and healthy boy. I have been unable to find any published account elsewhere.

Case XLVI.

Bayer's case, 1896, osteosarcoma (*Centralbl. f. Chir.*, 1897, No. 2).

The case was that of a boy, aged thirteen years, who had a sarcoma of the right thoracic wall. The tumor proceeded from the eighth rib, and was the size of a child's head. A musculo-cutaneous flap, with the convexity downward, was raised from the tumor. After separation of the insertion of the cartilage of the diseased rib the dissection of the tumor from the parietal pleura went on nicely for some space, until a place was reached where the pleura was adherent. Here it suddenly tore. The tear was tamponed, and the loosening of the pleura proceeded with further. There was another tear and collapse. The operation had to be discontinued, and rapid suture of a great tear in the pleura was done. The half of the tumor already dissected was dragged out and a tampon of iodoform gauze was put into the wound, which was left open. The patient recovered rapidly, and was well enough to be brought again into the operating-room three days later—on November 3d. At the second operation it was shown that the tumor reached inward and upward nearly to the vertebral column, and during the peeling away of this part of the tumor the pleura was widely torn again. He saw the lung completely collapse and sink back into the cavity. The patient seemed to sink. Bayer quickly drew the superior lobe of the lung up with the forceps out of the cavity of the thorax through the broad split in the pleura and fastened its under edge by means of stitches, separated about 3 cm. from each other to the periosteum of the sixth rib bounding the pleural tear above. At once the patient recovered himself, and the upper part of the lung was seen breathing regularly. The under lobe remained collapsed; so Bayer determined to leave the opening which remained after the previous operation, and which was still packed with the gauze put in at that time, in order to use it as a drainage opening and to avoid the gathering of secretions in the pleural sac. The course subsequently

was quite smooth. There was some dyspnœa in the first few days, and the dressing had to be changed on account of soaking. He had, as a matter of precaution, not sewed the great wound, but, after packing the lower pleural opening, had merely laid iodoform gauze over the upper part and dropped the flap over that. The lung in its upper part—that is, behind the whole extent of the flap—was functioning beautifully, and had he been able to fix the lower lobe also there would probably have been accomplished a rapid expansion of that lobe also, and there would have been no dyspnœa at all. The suture caused no trouble in the lung itself. As he wrote, on November 30, 1896, the wound was completely healed, the flap being drawn in considerably into the defect. [Bayer thinks this plan of fixing the lung to the thoracic wall is certainly a very simple procedure, calculated to permit this important organ to resume its function quickly, and I can quite agree with him, as it was quite effective in my own case, and did absolutely no harm. I do not think it necessary, however, to attempt to fix every part of the lung. All that is required is to sew the lung into the opening in such a way as to obturate completely the pleural cavity. The whole lung will gradually expand.]

Case XLVII.

Thompson's case (Reported by Davidson, 1896, sarcoma, *Texas Medical Journal*, Austin, 1896-1897, xii. 415).

Mrs. L. W., aged forty-five years, married, admitted to John Seely Hospital, Galveston, February 14, 1896. No history of any tumor-growth in family. She has had six children, the eldest being twenty, the youngest six. Patient's health has always been good. Gives no history of syphilis, gout, rheumatism, or any constitutional taint; habits have been good and she has led an active life.

One year ago last August a small subcutaneous nodule about the size of the end of one's finger was noticed two inches below and a little to the right of the left nipple. Felt more like cartilage than anything else. No dimpling of skin; no pain. It increased in size, becoming more and

more rapid as it grew older. In January, 1895, it was the size of a large pecan, and last summer (August), that of a hen's egg. From this time on the tumor grew fast, and became painful. The pain was of a deep, boring nature; there was occasionally a prickling sensation toward its sternal end. The pain was constant, growing more intense, so that for the last month the patient had been kept awake at night.

Fairly well nourished. No digestive disturbance since tumor appeared. No axillary enlargement. Has fallen off about ten pounds in the last few months. Lungs and heart normal. Examination of urine negative. Inspection reveals a tumor about the size of one's fist on the left side of the chest, having a nodular appearance. It occupies the sternal portion of the fourth, fifth, sixth, and seventh ribs, and their costal cartilages. The bulk of the tumor is below and to the inner side of the nipple. The mass is hard and firmly adherent to the ribs. In moving the tumor the ribs move with it, just as if they were part of it. No points of fluctuation. Indistinct outline at edges. The skin is not adherent to the growth. No tenderness complained of upon palpation.

Diagnosis: Tumor hard, growing from cartilage; chondrosarcoma.

Operation: Prof. J. E. Thompson did the operation, 9 A.M., February 17th. An incision was made through the skin, beginning at the lower border of the sternal articulation of the third rib and extended in a semi-lunar direction downward and outward to the upper border of the sixth rib; thence outward and upward to a point to the left of the nipple. Immediately below the skin the tumor appeared, free from breast tissue. A few bloodvessels were clamped and the flap retracted, carrying with it the mammary gland. To the left of the tumor the third and fourth ribs were exposed and freed from their periosteum, and then cut directly through with bone forceps. These two ribs were again cut about three-quarters to one inch more to the median line, thus allowing a small piece of these ribs and the parietal pleura to be removed. Now the lung

was exposed, but not yet collapsed. The index and middle fingers were then passed into the pleural cavity and used as directors, and with a stout pair of curved scissors the cartilaginous portion of the third rib was cut loose, then the sternal attachments of the fourth and fifth ribs, and, finally, the cartilage of the sixth rib severed. The pleura was included. Thus a hole about three inches in diameter was made; the lung was seen expanding under our eyes, the heart beating very slowly from the chloroform anæsthesia. The lung became more and more collapsed from exposure. Some bleeding from the intercostals and internal mammary. Bleeding stopped by pressure. The skin-flap was brought together with interrupted sutures of catgut. A plug of iodoform gauze was allowed to protrude through the outer part of the incision for drainage. Iodoform powder was dusted along the line of suture, a small strip of gauze and sterile cotton applied and held in place by a many-tailed bandage. Operation finished at 10.15 A.M. The pulse continued weak awhile after the operation, but the patient improved and gradually recovered, the wound healing by first intention. The gauze had been removed on the third day.

The tumor on examination was firm, cutting with resistance. A microscopical examination shows the structure of large spindle cells arranged in alveoli with considerable cartilage in the hyaline matrix; the giant cells scattered here and there in groups.

Contrary to expectation, the growth recurred. The patient returned to the hospital in July for further treatment. The neoplasm had recurred practically all around the line of the previous incision, involving the axillary space from the fourth to the sixth ribs. Prof. William Keiller operated. The patient left two weeks afterward. There was some tenderness and thickening over the third rib. The growth had returned and was growing rapidly, but was not associated as yet with much pain.

Case XLVIII.

Doyen's case, sarcoma, year not stated (Quénu and Longuet's article, *Revue de Chirurgie*, May 10, 1898, p. 399).

In the table of cases it is stated only that the patient was a child and that the thorax was resected with adjacent pleura, giving rise to dyspnœic accidents. But the following is translated from Quénu and Longuet's paper, p. 383:

"We have observed," says Doyen, "one of these sudden syncopes upon opening the pleura, in the case of a young girl from whom we were extracting a wide sarcoma of the thoracic wall, which adhered to the ribs and reached to the parietal pleura. The diagnosis of a malignant tumor involving the pleura having been previously made, we spared intentionally, in dissecting out the tumor, enough flap to close the pleural orifice. The child suffocated as soon as the air entered the pleural cavity. The lung totally collapsed; a few efforts at coughing uselessly distended it, at the expense of the air still contained in the opposite lung. Another expiration, and death was imminent. With four strokes of the scissors a quadrilateral piece of the thoracic wall was removed, the skin flap was pulled over the gaping pleural opening, and the lips of the incision drawn together with forceps, aided by elastic pressure. Thereupon respiratory efforts became efficacious again. A few moments later the lips, up to this time pale and purple, resumed a pinkish tint, and the pulse became satisfactory. . . . In a few hours the little patient had recovered from this really thrilling operation. We have likewise observed grave dyspnœic symptoms in several operations on pulmonary cavities or hydatid cysts of the lung and of the pleura."

Case XLIX.

Helferich's last case, 1897, sarcoma (Reported by Gerulanos in *Deutsch. Zeitsch. f. Chir.*, October, 1898, xlix. p. 498).

W. W., aged fifteen years, laborer, from Schlemmin, was admitted into Helferich's clinic April 6, 1897. Parents

living and healthy. One brother died of diphtheria. No hereditary history. As a child had measles and diphtheria, otherwise has been healthy. In the summer of 1896 he received a heavy blow on his right side, in the region of the breast. With the exception of transient pains he had little trouble from this, and was able to go on with his work. After some weeks, however, he began to have stitch-pains on the same spot, which gradually increased in intensity, so that he was forced soon to give up his work and apply to the clinic for relief.

Condition on admission: Patient is of small stature, gracefully formed, of weak musculature and anæmic mucous membranes; otherwise not of sickly appearance. There exists disposition to cough; trace of mucous expectoration; no dyspnœa. Respirations 22 per minute. No pains on breathing, but some while at work. Thorax is weakly built. The supraclavicular and infraclavicular fossæ appear on the two sides alike, but there exists on the right of the mammillary line up to the posterior axillary line, from the third to the seventh rib, a flattened swelling, which is covered by unaltered skin. At this place the ribs cannot be felt. There is a slight left skoliosis. There is diminished respiratory movement on the right. Percussion is painful over the swelling. There is a dull area over the region of the swelling, with difficulty differentiated from the liver dulness. Over the swelling there is heaving respiration and pectoral fremitus. There are no heart disturbances, and the pulse is regular and about 90 to 100 per minute. Abdominal organs normal, urine shows nothing abnormal.

The differential diagnosis was difficult between encapsulated blood extravasation in the pleura, chronic disease of the ribs, and a tumor of the chest-wall.

The following operation was carried out on April 7, 1897: An incision was made along the sixth rib corresponding to the prominence of the swelling. At the outer end of the wound the rib is almost substituted by easily bleeding granulations. This rib was cut off through sound bone. Toward

the middle line the rib cannot be found, but instead only broken-down tumor masses. More deeply is a fist-sized cavity, filled with a pulpy mass of broken-down tissue mixed with blood. The bleeding continuing, the hole was tamponed and a bandage applied. The microscopical examination could not make out sarcoma, but rather pointed toward a caries of the rib. The subsequent course was quite smooth, and seemed to justify the expectation of ultimate recovery. The boy's general condition improved, and he gained steadily in weight. Only toward the end of May was there any change for the worse.

June 8th. Patient looks pale, almost cachectic. Temperature normal, pulse weak, 70 per minute. The cicatrix shows in several places small tumor masses, and is œdematous. In the middle of this cicatrix is an opening about the size of a thaler piece, surrounded by shiny, broken-down granulations. This opening leads into a cavity about 12 cm. deep, filled with soft masses. The whole region of the cicatrix is distinctly bulging. This bulging reaches from the parasternal line in front to the scapula behind, and from the fourth rib above to the eighth below. Percussion shows dulness from the mammary line at the fourth rib obliquely upward to the spine of the scapula, posteriorly; this area merges below with the liver dulness, toward the median side above reaches the parasternal line, and below corresponds with the heart dulness. Behind it reaches to the inner edge of the scapula below. The auscultatory signs are changed materially only in the region of the bulging.

There seemed now no doubt as to the presence of a sarcoma of the thoracic wall, and so operation was determined on.

This was carried out by Prof. Helferich on June 9, 1897, under chloroform. The old cicatrix was first surrounded by an elliptical incision carried through the sound tissues. From each end of this ellipse an incision was made, one forward to the cartilaginous part of the rib (sixth), the other backward to the scapula. The length of the incision was about 25 cm. A second incision was made parallel to the right edge of the

Fig. 6.

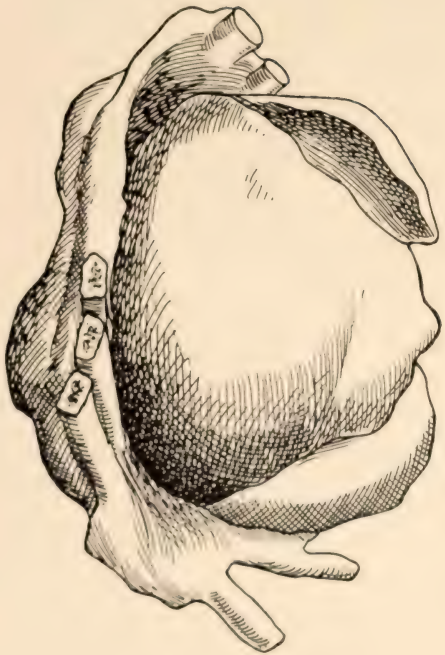


Fig. 7.

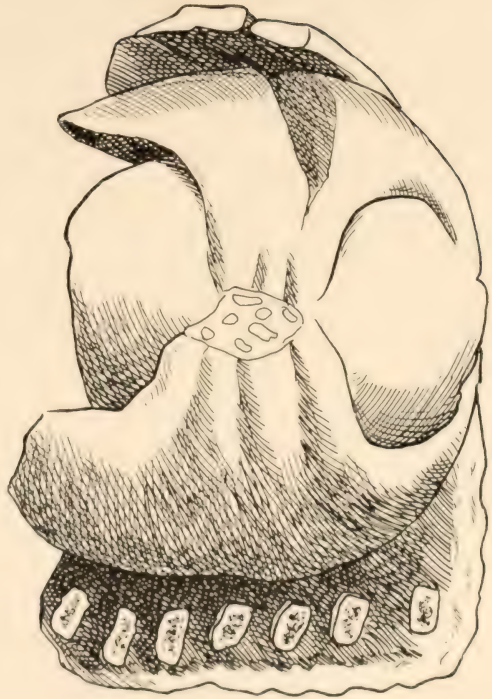
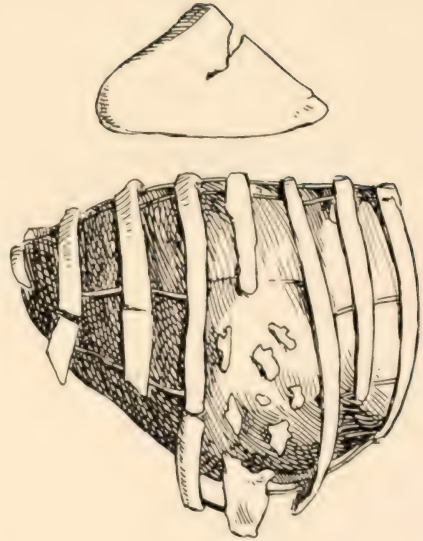


Fig. 8.



sternum, about two finger-breadths from it. This was 10 cm. in length, and reached from the third to the seventh ribs. The flaps were dissected, one upward, the other downward. The inferior inner angle of this immense wound showed the seventh rib, which was resected to the extent of about 8 cm. The pleural cavity was opened here about three finger-breadths below and internally to the former cicatrix. The visceral and parietal pleuræ were not adherent. The finger introduced into the cavity came directly into contact with the dome of the diaphragm below and with the mediastinal wall internally. The tumor was found to fill the chest cavity at this point, so that apparently only a small quantity of lung tissue remained. The attempt was now made to lay bare the upper part of the tumor and to explore it. With this object in view the third rib was resected from its cartilage to the scapula, about 12 cm. in length, and the pleura was again opened. The finger could now feel that the upper surface of the tumor was, like the lower, smooth and free from adhesions. The tumor appeared likewise here to be non-adherent to the mediastinum. It reached from the sternum to the vertebral column, and seemed attached to the chest-wall over a large area. The upper lobe of the lung was free, but the middle and lower could not be felt. The whole space seemed occupied by the tumor. The space behind the cartilages was free, so that the finger introduced from above could be brought into contact with the one carried through the lower opening. A piece of gauze was now passed through this canal, and upon it the insertions of the fourth, fifth, and sixth ribs were cut through with the bone shears, together with the overlying soft parts. The internal mammary artery was not injured, but four intercostal arteries had to be first compressed and then treated by suture ligature.

Now the chest-wall from the third to the seventh ribs could be drawn outward from the sternum, so that the intrapleural relations could be more accurately examined. The tumor, which was of the size of a child's head, was firmly adherent to the lateral wall of the chest, and had incorporated with

itself the whole middle and inferior lobes of the lung; the upper lobe was free and not adherent to the tumor.

Since the tumor had not advanced toward the mediastinum, indeed seemed to be separated from it by normal lung tissue, and since, between the tumor and the dome of the diaphragm only loose adhesions were found, it was thought that a radical extirpation of the tumor was possible, provided that a separation of the lung at its root could be accomplished. After partly sharp, partly blunt, separation of the bronchus and of the vessels of the upper lobe, which was done without great difficulty, two large, strong forceps were put on the root of the lung. No unusual disturbances of the heart or respiration were observed; so the strength of the patient being well maintained, the operation was proceeded with. The root of the lung was now ligatured with a catgut ligature passed through by means of a round needle. The lung tissue, also, in so far as it was connected with the upper lobe, was ligated with the assistance of a threaded needle and cut off. There was no bleeding. The ligation of the bloodvessels and bronchi of the severed root offered no special difficulty. A part of the lung tissue which remained hanging to the stump was so utilized that the root stump was completely covered over with the serous layer. The tumor being freed from the mediastinum, and the adhesions with the upper lobe and with the diaphragm separated, the mass was now connected only with the chest-wall. The attachments of the tumor had required the removal of the thoracic wall from the level of the third rib down to the insertions of the diaphragm and back as far as the vertebral column. For the separation of this vast mass Helferich used the bow-saw with great advantage, doing the work expeditiously and with very little blood loss. The route of the saw was as follows: Above, through the third rib, the tissues of the third intercostal space, the musculature of the back, and the scapula horizontally under the spine; below, the saw-line extended from the insertion of the seventh rib in front to the junction of the eleventh rib with the vertebral column behind, thus cutting through obliquely the seventh,

eighth, ninth, and tenth ribs, with the corresponding intercostal spaces. The bleeding was easily controlled by compression and suture ligature of the severed intercostal arteries. The tumor was now attached only to the lung and to the vertebral column behind. The tumor being lifted and forcibly bent backward, the ribs were broken through at their necks, and the separation was completed with the bone shears and scissors. There now remained only a small part of the chest-wall attached to the completely collapsed upper lobe of the lung above and the abdominal part of the rib-wall below. The right half of the diaphragm and the right wall of the mediastinum were now in full view. The skin had retracted so far and the surface was so uneven that it was impossible to cover over the vast wound. It was therefore packed with warm gauze and a dressing applied.

The operation had lasted one and one-half hours. Neither when the pleural cavity was opened nor when the root of the lung was compressed were there any threatening signs, but the duration of the operation, the severe operative attack, the not inconsiderable blood-loss, and the marked chilling of the surface had brought about a degree of general collapse that required prompt attention. The face and mucous membranes were pale and somewhat livid, the pulse scarcely perceptible, accelerated, but regular, breathing superficial and rapid. Camphor injections subcutaneously and a litre of salt solution were given and warm packs applied. A few hours later the condition had much improved, the extremities being warm, the color much better, the pulse easily felt at 140, and consciousness had returned. Later he was still better, and the collapse seemed overcome, though he was still extremely weak. He took nourishment and expressed himself as feeling better. At six o'clock, June 11th, he seemed weaker, and the pulse could not be felt, the heart beating 160 per minute. Death followed gradually, and without special phenomena, at 7 A.M.

The autopsy showed marked anæmia of all organs. There was no infection of the wound and no sign of after-bleeding.

The left lung showed no change, and the heart was likewise found in a healthy condition. There was nothing abnormal in the abdomen, and nowhere was any metastasis to be discovered.

The tumor weighed 2130 grammes (about seventy-five ounces, or a little over four and one-half pounds). The measurements were: Height, 15 cm.; antero-posterior diameter, 16 cm.; distance from the outer aspect to the root of the lung, 15 cm. Seven ribs were found incorporated in the tumor, namely, the fourth, fifth, sixth, seventh, eighth, ninth, and tenth. In addition to these the third had been resected as one of the first steps of the operation, in order to get at the pleural cavity from above. The lengths of the various ribs resected were as follows: Third, 27 cm.; fourth, fifth, sixth, and seventh, 26–28 cm.; eighth, 19 cm.; ninth, 15 cm.; tenth, 9 cm. The fourth, fifth, and sixth were resected from their necks behind to their cartilages in front. The accompanying cuts give a very good idea of the size and relations of the tumor.

Case L.

Parham's first case, 1897; sarcoma.

L. B., aged twenty-seven years, colored, native of Louisiana; she has lived in New Orleans three years.

Family history good, personal history excellent. She was admitted to ward 36 of the Charity Hospital on February 16, 1897. She had noticed a swelling in the region of the right breast the previous summer. This grew rapidly. No further history could be obtained.

On admission a large, hard tumor, ovoid in shape, was found situated on the right side of the chest, apparently in the mammary gland. It was immovably fixed on the ribs, the whole chest moving when the tumor was grasped and forcibly manipulated. A diagnosis of osteosarcoma was made.

I did the operation February 22, 1897. The incision was a curvilinear cut transversely across the chest under the immense pendulous mammary gland. The muscles were cut transversely also. Nothing noteworthy occurred until the

resection of the ribs, to free the tumor, was attempted. Several tears in the pleura now occurred while it was being separated from the growth, the pneumothorax being temporarily controlled by gauze tamponade. The pleura was rapidly separated from the tumor by pushing it away with the four fingers; but notwithstanding most careful manipulation, when the tumor was removed a rent in the pleura was found, five inches long, through which the whole hand could easily be thrust in. The air rushed in and collapsed the lung completely. It could be seen at the bottom of the cavity, against the vertebral column and mediastinum, making, it is true, feeble efforts to do its share of work, but it was practically eliminated from the labor of respiration. The condition for a time was extremely grave, and death on the table seemed imminent, the pulse failing to the point of almost total disappearance. While my assistants administered strychnine and digitalis hypodermatically, and attempted by artificial respiration to arouse the respiratory functions and the failing pulse, I tried to suture the rent in the pleura, but unsuccessfully, the stitches invariably tearing through when tied. The movements of the diaphragm and frequent coughing spells, during which the lung was violently blown out through the opening, made this an impossible undertaking. Realizing that this could not be done, I brought down the ragged pectoral muscle, placed it over the pleural rent, and sutured it there. When this was done her breathing improved, and she began to revive. The operation was completed by suturing most of the skin flap, leaving a large opening for drainage at the posterior aspect of the wound, which was packed with gauze. The mammary gland was not removed, as she had made a specific stipulation that it should be left. In the operation the third, fourth, and fifth ribs were resected, about five inches of each being taken away. The tumor sprang from the fourth rib, and involved the others by gradual growth and disintegration of their substance. The operation was begun at 11 A.M. and finished at about one o'clock. At the termination of the operation she was infused with salt solu-

tion. No record of the amount was kept, but it was sufficient to have a decided influence. The shock was very great, but her condition was improving, when returned to the ward, although she complained of nausea, vomited frequently, and was perspiring profusely. Strychnine, digitalis, and morphine were given at short intervals and continued at varying intervals for some days. When she was sent back to the ward her pulse was 132, respiration 62. At two o'clock that afternoon the pulse had fallen to 120, respiration 48. The next day the patient was still extremely restless, and had had a bad night. The pulse and respiration, however, continued improving during the second day, notwithstanding intense nausea and frequent vomiting. Temperature did not rise to 101° until the evening of the second day, when it reached 103.3° at 3.40 o'clock in the afternoon.

				Temp.	*Pulse.*	*Respiration.*
Third day.	Feb.	24.	8.30 A.M.	102.8	120	38
Fifth day.	Feb.	26.	8.30 A.M.	101.2	126	38
" "	"	26.	4.30 P.M.	102.7	130	46
Patient slept nearly all day.						
Sixth day.	Feb.	27.	.....	102.8	....	...
" "	"	27.	4.00 P.M.	103.0	120	54
Seventh day.	Feb.	28.	9.00 A.M.	102.0	118	26
" "	"	28.	4.30 P.M.	102.9	....	...
Eighth day.	March	1.	8.30 A.M.	102.0	130	42
" "	"	1.	4.00 P.M.	102.0	116	52
Ninth day.	March	2.	8.30 A.M.	101.8	108	32
" "	"	2.	6.20 P.M.	102.0	128	52
Tenth day.	March	3.	8.30 A.M.	101.0	88	56
" "	"	3.	4.30 P.M.	102.0	104	54
Eleventh day.	March	4.	8.30 A.M.	101.4	106	32
" "	"	4.	4.30 P.M.	102.0	132	64
Patient had been restless during the first part of the night, but slept very well toward morning, without having had to take any morphine.						
Twelfth day.	March	5.	7.30 A.M.	101.0	104	68
" "	"	5.	4.30 P.M.	102.0	132	64
Patient has been sleeping nearly all day; does not seem to suffer.						
Thirteenth day.	March	6.	8.30 A.M.	101.5	108	52
" "	"	6.	4.00 P.M.	103.2	112	48
" "	"	6.	9.00 P.M.	102.2	108	50
Patient has been restless during day; not taking nourishment well.						
Fourteenth day.	March	7.	8.30 A.M.	100.7	120	48
Patient restless during night, slept very little; complained of nausea.						
Seventeenth day.	March	10.	9.00 P.M.	101.4	108	40
Nineteenth day.	March	12.	7.00 A.M.	101.2	108	32
" "	"	12.	9.00 P.M.	100.0	122	38
Patient coughing and quite restless.						

			Temp.	Pulse.	Respiration.
Twentieth day.	March 13.	8.00 A.M.	99.8	112	36
Patient restless during night; coughing frequently.					
Twenty-first day.	March 14.	8.30 A.M.	99.7	120	40
" "	" 14.	3.30 P.M.	100.4	120	40
Patient did not complain much of pain during the night, and rested very well.					
Twenty-third day.	March 16.	8.30 A.M.	100.0	108	30
Patient restless; complained most of the night.					
Twenty-fourth day.	March 17.	8.30 A.M.	99.0	120	32
Patient slept and rested very well during night.					
Twenty-fifth day.	March 18.	8.00 A.M.	99.0	100	28

From this time on the patient made steady improvement. She stayed in the hospital until April 19, 1897, when she was discharged in a satisfactory condition. The wound had suffered extensive sloughing of the skin and muscle, but on discharge was entirely healed. She was photographed May 8, 1897. March 20, 1898, the patient was again admitted to the hospital suffering from acute lobar pneumonia on the same side. She was discharged, well, just one year after operation—April 19, 1898. There was no recurrence whatever. (See Fig. 9.)

Case LI.

Gauthier's case, 1898, sarcoma (*Revue Internationale de Médicine et de Chirurgie*, October 25, 1898, ix. No. 20).

Monsieur l'Abbe X., vicar, aged twenty-seven years, consulted me in September, 1897, complaining of violent pains on the left side and a little toward the back. Examination revealed nothing in the chest, and no tumor was apparent.

Diagnosis of intercostal neuralgia was made. Returned in October, 1897, again complaining and drawing attention to a slight enlargement situated on the left side, posteriorly, at the level of the ninth rib.

Operation was proposed, but declined. He returned in December, and then progress was evident. The tumor had attained the size of an orange. A fluctuating point justified Gauthier in announcing a diagnosis of cold abscess of slow evolution, developed on the diseased rib. He accepted advice, and was operated on, January 21, 1898. Notwithstanding this unusually slow evolution, Gauthier believed he had to deal with a cold abscess, and was disagreeably surprised by falling, with

the first stroke of the bistoury, into a mass having the microscopic characters of a cystic osteosarcoma. The hope of being able to resect the pleura was soon shown to be illusory, for it was intimately adherent. Gauthier had then to decide between an operation, frankly incomplete, leaving half of the tumor in place, or an operation, intrapleural, with operative pneumothorax, whose gravity he would not disguise from himself.

With the point of a bistoury a small opening was made a little above the neoplasm, and this was immediately closed with gauze, to permit the air to enter only very slowly and to prevent the too brusque retreat of the lungs. After two minutes he proceeded more rapidly with scissors to remove a portion of the costal pleura as large as the hand. Having tied the intercostal arteries, the wound was closed except where a large piece of skin had been removed. This space was packed with gauze. During the whole operation the breathing was bad, and there were several bad attacks of cyanosis. The chloroform, which was badly supported, was stopped when the pleura was opened. Respiration became very short and rapid, and it was necessary to give some injections of ether and caffeine. There was, however, neither syncope nor arrest of respiration. The patient having been carried to his bed, he got an injection of one quart of artificial serum.

January 22*d*. Pulse 144, respiration 38, temperature 37° to 37.8°.

23*d*. Pulse 132, 148, respiration 30, 35, temperature 38.2° to 39°.

Dressing was changed. Pleural adhesion already existing. Pleural adhesion developed with excessive rapidity, so that, the temperature being still up, an abscess was feared; but this was not found until February 27th. About 400 or 500 grammes of pus was evacuated. The cavity was washed and drained through rubber tubes.

March 15*th*. The tube escaped into the pleura. Gauthier was called to get it out. In the month of May he was completely recovered.

Gauthier saw him in June. No sign of recurrence. Cica-

trix was beautiful. At the end of August he returned with signs of recurrence. The ends of the resected ribs were enlarged and a tumor the size of a nut in the place of the old tumor. Operation was proposed, but he hesitated. He finally went to Paris to undergo operation under conditions infinitely more advantageous than the first, the lung being now completely surrounded by pleural adhesions.

The recurrence showed itself about six months after the operation and about three or four months after the complete cure by the first intervention.

Case LII.

Parham's second case, 1898, chondrosarcoma.[1]

J. R., aged twenty-eight years; ward No. 10, Charity Hospital. Admitted to service of Dr. Parham, July 24, 1898.

Previous History. Born in Iowa. Patient has led a roving life, but has lived in Louisiana for the past seven years.

Family History. Father died at sixty-eight years; cause unknown; mother living, as also three brothers and one sister.

Personal History. Measles when a child; malarial attacks twice in the last ten years; soft chancre ten years ago, followed by ulcers on the legs, scars of which can still be seen.

History of Present Disease. His occupation was that of a tinner. He frequently used a brace and drill in mending stoves, resting the brace against the left chest-wall. He never felt any pain, however.

He first noticed a swelling, about six years ago, about the size of an egg. The tumor grew very slowly, being last fall about the size of a turkey egg. Rate of growth has since this time been more rapid. Pain has been present during the past eight months. This pain, at first sharp and lancinating, afterward duller in character, seemed severer when in repose.

Condition on Admission. Was rather anæmic and pulse was weak, but he was otherwise in excellent condition.

Examination just before Operation. Heart, lungs, and urinary organs normal; general condition satisfactory.

[1] For the notes upon which this history is based I am indebted to Mr. B. Guthrie, interne in charge of my service.

The tumor, which occupied the upper half of the left side of the chest, was firmly united with the ribs and extended from the clavicle to the sixth rib. It was a firm, solid tumor, ovoid in shape.

Operation, August 6, 1898, 9 A.M. The anæsthetic was chloroform, administered by Mr. Mason, interne. I was assisted in the operation by Dr. E. D. Martin, Dr. F. A. Larue, and Dr. J. D. Bloom, the house surgeon, who kindly attended to the management of the Fell-O'Dwyer apparatus.

Operation: A fan-shaped flap was outlined by an incision approximately parallel with the boundaries of the greater pectoral muscle, the muscle being cut through transversely below between the seventh and eighth ribs and along the sternum and inner half of clavicle. The skin and muscles were raised together. The minor pectoral was represented by only a few attenuated fibres, which could not be taken up as a distinct layer. The flap having been well turned up over the clavicle and covered with gauze, the tumor was now cleared thoroughly at its base and the ribs exposed. It was easily seen at this stage that the first rib was not involved in the tumor. The axillary structures were easily avoided by dragging them, with the pedicle of the flap, upward, toward, and over the clavicle and coracoid process. An attempt was now made to resect a portion of the fifth rib, in order to identify and begin the clearing of the pleura from the tumor, but this proved to be impracticable, the pleura being naturally so thin at this point. The cavity was unavoidably opened, and there was a sudden in-rush of air, which was, however, easily controlled by gauze packing. A second attempt was made to clear the fifth rib at another point. This was partially successful, but in the intercostal space above the pleura was again torn, and the patient showed sudden signs of collapse. The fifth rib was quickly cut in front and then in the axillary line behind the tumor. The lung was now almost completely collapsed, and there was a sudden fall in the pulse, almost to disappearance, the patient becoming blanched and showing all the signs of profound shock. The pleural openings were

Fig. 9.

The figure represents the case after she was discharged; unfortunately no photograph was taken before operation.

Fig. 10.

Fig. 11.

Fig. 12

Fig. 13.

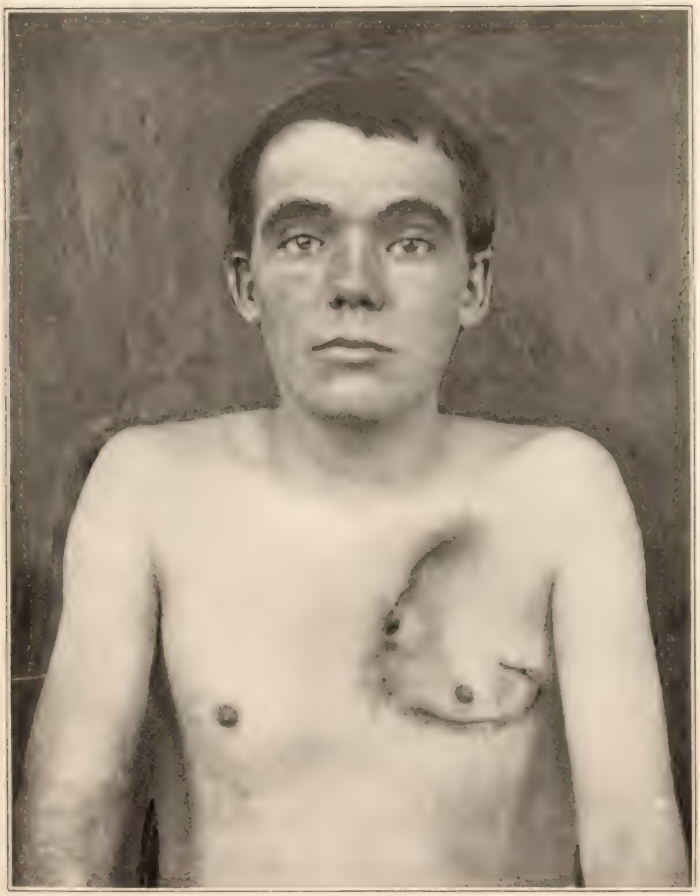


Fig. 14.

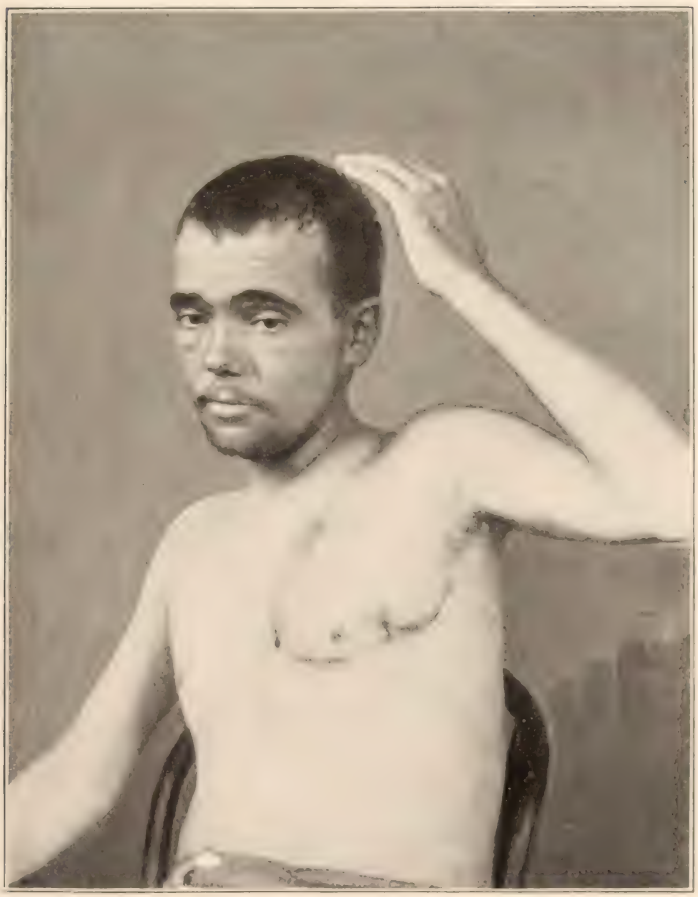
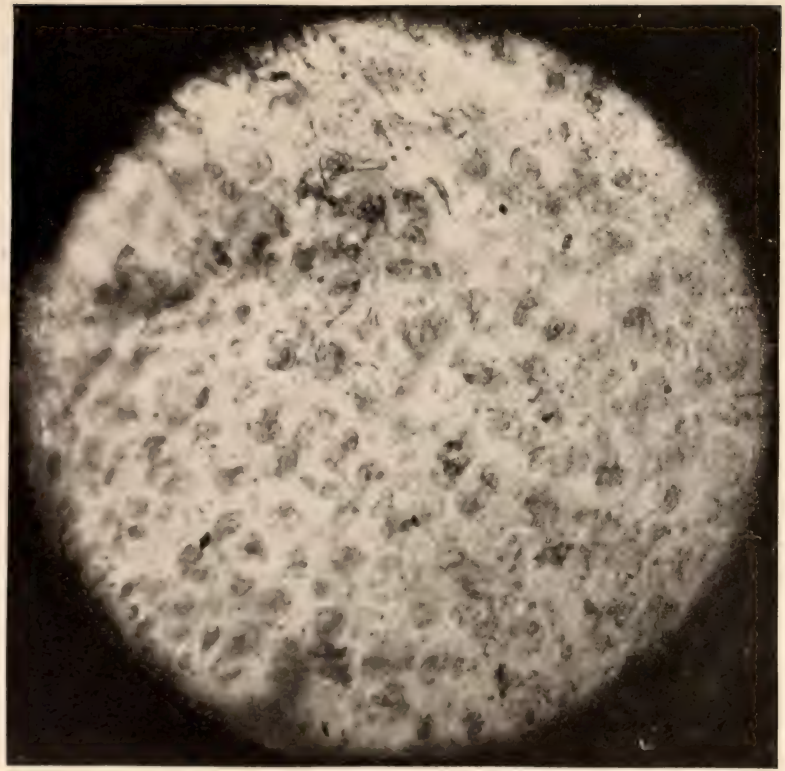
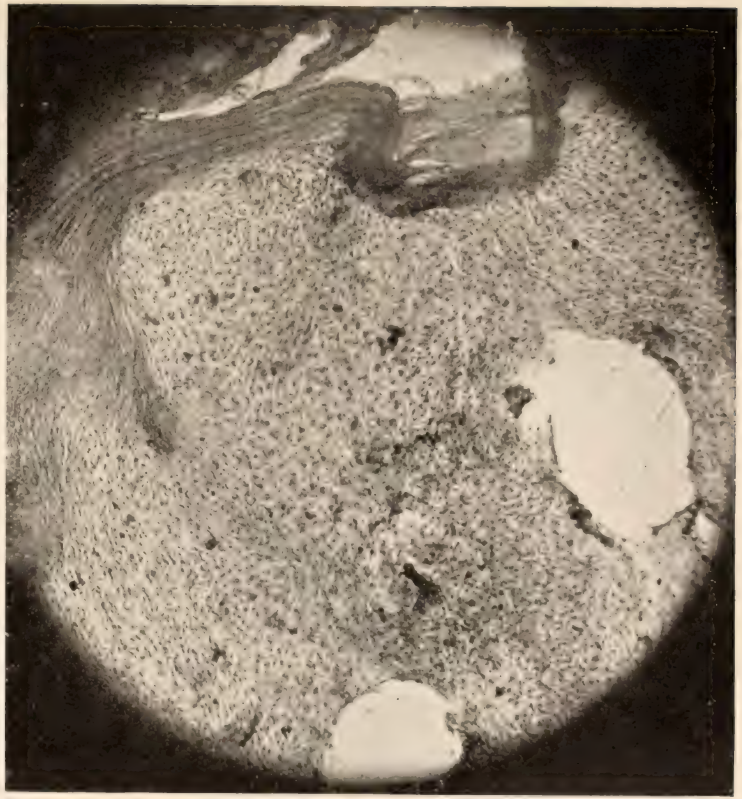


Fig. 15.



High power.

Fig. 16.



Low power.

packed quickly with gauze, and Dr. Bloom was requested to begin the use of the Fell-O'Dwyer apparatus. As soon as the tube was inserted and the apparatus working the lung began to recover itself, and the man's condition at once improved. The respiration was now admirably maintained, so the operation was proceeded with. The fifth rib had now been loosened by cutting it through in front and behind. The soft parts between these two points were cut through quickly with the scissors, and then the fourth rib was cut through in the axillary line, the costal attachment being as yet unattacked; then in turn the third and the second ribs were cut in the axillary line. Scissors were then run along rapidly through the first intercostal space, and the second, third, fourth, and fifth ribs were successively attacked in front, being cut through with the bone forceps. The remaining soft parts were cut through with the scissors, and the pleura, being peeled off from the tumor with the fingers, the growth was taken away. There was now a very large hiatus in the anterior wall of the chest, through which the lung could be beautifully seen alternately expanding and contracting. The assistance rendered by the Fell-O'Dwyer apparatus was evident to all. Whenever there was any hitch in working the apparatus the lung at once showed signs of collapsing, but when the apparatus was in working order respiration was almost as regular as the normal breathing. I can imagine no better demonstration of the usefulness of this admirable device. This artificial breathing was maintained until the lung could be drawn out sufficiently to be sutured with a continuous catgut suture to the margin of the opening. This being done, there was no further tendency to collapse of the lung, and so the Fell-O'Dwyer was discontinued. Before this suture had been begun, violent spells of coughing, which were rather frequent, somewhat delayed the operation, as with each attack the lung was forcibly extruded through the opening, the inferior lobe being driven completely out, so that it could be picked up in the hand. The lower lobe of the lung was never at any time pushed up by collapse so far as to expose the pericardium, so

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that no distinct view of the pericardium and the working of the heart could be obtained.

It was observed by all present that the lung expanded in expiration and fell back in inspiration. The operation was completed by the uniting of the muscles and the skin by separate sutures. The duration of the anæsthesia was one hour and forty minutes. The man was sent to the ward in a very satisfactory condition. The wound was completely closed without drainage, the pectoral muscle being separately united.

August 6th. During the day the temperature rose once to 101.6°, pulse to 108. Respirations very little quickened.

7th. Day after the operation the temperature ranged from 100° to 100.8°, and the pulse only reached 100, being generally about 85. The respirations averaged about 24.

8th. Temperature never went up to 100°, pulse only once as high as 80. There was some slight dyspnœa, some pain in chest, and he was somewhat paler.

9th. Temperature up to 101°, pulse remaining at 80. Some dyspnœa; severe pains in the side.

Finding at my morning visit evidences of fluid in the chest, I returned in the afternoon and aspirated in the interscapulovertebral space 4 oz. of bloody serum and a considerable quantity of air. Removed all the cutaneous stitches and put on collodion and cotton. From the tenth to the fourteenth day the temperature kept above 100°, though the pulse was rarely over 85, the respirations ranging from 17 to 24, very regular and full. The left lung had evidently expanded considerably. As the dyspnœa was somewhat greater, the cyanosis more evident, and the physical signs showing accumulation in the chest, I again aspirated, drawing off ten ounces of sanguinolent fluid. More air came away than could be accounted for by leakage of the syringe. After this he breathed more easily, but the temperature rose by night, and on the next day, August 16th, reached 103° in the evening. The wound on its inner aspect had opened and was discharging pus.

18th. There is some slight subcutaneous emphysema in the axillary region. The temperature reached 103°. On the

20th it was at 2 A.M. 104°, but fell to 102° by 5.30 P.M., rising again at night to 103°.

22*d*. The temperature had been running high, reaching again 104° in the night. Opened up the wound at two places, finding two large abscesses, one antero-superiorly, the other at the lower and inner side. The abscesses apparently rested on lung substance. Washed out with hydrogen dioxide, followed by one per thousand formalin solution, and packed.

24*th*. During irrigation of abscess cavities by Dr. Larue there was a sudden and violent attack of dyspnœa, only arrested by turning the patient on the affected side.

25*th*. Doing better. The temperature has been constantly lower since the opening of the abscesses. For a long time the lower wound discharged, and a fistula could be traced backward for six or eight inches. The percussion not clearing up in this region behind, I contemplated a posterior resection for drainage, but gradually the discharge diminished, and, finally, on November 7th, it was found completely closed. I believe the suppuration to have been due to the silk stitch which I put in as a continuous suture, uniting the pectoral muscle. This stitch came away covered with pus.

December 3*d*. Came to my office for examination. The lung seems almost completely to have recovered its expansion power. The skin is drawn in on inspiration and is pushed out in expiration. On forced expiration or in coughing the lung herniates through the opening, producing a large protrusion of the skin. The hand can be pushed well into the defect, and the ventricle can be distinctly felt to the inner side of the defect. I believe some valuable investigations could be made into the physiology of the heart and its innervation, so accessible is it to palpation and the application of electrodes. Von Ziemssen has made a most elaborate study of the celebrated Fischer case (Case XI.), operated on in 1878, and also of one of Helferich's cases (Case XVII.), operated on later. I shall have a shield made to protect him from injury and to interfere with the development of hernia of the lung through the defect. A letter received from him the latter

part of December, five months after the operation, says he is well.[1]

The tumor was a chondrosarcoma, starting from the third rib.

The accompanying photographs give a good idea of the size and relations of the tumor. The structure of the tumor was of hyaline cartilage. I am much indebted to Dr. O. L. Pothier, Hospital Pathologist, for the photographs and the photo-micrographs of this case.

Dimensions of tumor:	Circumference, horizontal	38 cm.
" " "	sagittal	38 "
" " "	vertical	35 "
Length of ribs removed,	second	10 "
" " "	third	13 "
" " "	fourth	12 "
Cartilage removed		1 "
Weight		771 grammes.

The sternal cases of König and Küster are here reported more fully, as they illustrate some special points of interest. Other sternal cases are to be found further on in tabulated form.

Case II.

König's case, 1882, sternal sarcoma (Leonhard Meyer, *Inaug. Diss.*, 1889).

This was a woman, aged thirty-six years. There was a tumor situated in the region of the sternum; it had been developing two and one-half years without much pain. It extended across the body of the sternum, without showing much laterally. It extended forward to the insertion of the second rib, being completely fixed to the sternum. The patient was otherwise healthy. König made a diagnosis of endosteal tumor and myeloid sarcoma of the sternum.

Operation, July 17, 1882. A transverse incision was made through the skin, the four flaps being dissected away from the sternum, exposing above, the manubrium, laterally, the cartilages of the ribs, and below the xiphoid process. The upper ribs were separated about 3 cm. from the sternal edge and freed of soft parts by the elevator. The sternum was sawed through at the level of the first rib with the bow-

[1] A note just received (May 26) assures me he is still well.

saw. Now followed the hardest part of the operation, namely, the lifting and loosening of the sternum and the tumor from the mediastinum. The sternum was held up and, with sharp hooks and the finger, cautiously pushed in between the tumor and the mediastinum. Both mammary arteries were exposed and tied double and cut. In spite of the greatest care the right pleural sac was torn at the level of the fourth rib. A prominence of the tumor was closely adherent to the pericardium, and had to be cut with scissors. The sac was injured and the right ventricle came into view. Then in the further dissection, the left pleura was torn. The openings in the pleura were quickly closed with gauze balls. The flaps were sewed from below upward in such a manner that the gauze balls could be removed. Drains placed in the lateral ends of the wound and a large dressing applied. The patient recovered well. There were no violent symptoms of any kind. On the fourth day there was great frequency of pulse, controlled by digitalis. The healing was *per primam*, except a small surface. [Patient died a year later of rheumatic fever, as I learn from Paget's account of the case, p. 173.]

Case III.

Küster's case, 1882, gumma of sternum (*Berlin. klin. Woch.*, 1882, 127; also Baldus, *Inaug. Diss.*, 1887).

A man, aged thirty years, a picture of vigorous health, with no history and absolutely no signs of syphilitic trouble. He perceived, in 1882, a tumor on the right side of the sternum, with dull pains deep in the chest.

The tumor grew slowly. He was admitted to the Augusta Hospital, Berlin, October, 1882. He was put upon iodide of potassium, which was kept up six weeks without effect. A tumor the size of a goose-egg was observed on the right side of the sternum and closely attached to this bone at the level of the third and fourth ribs.

Operation October 27, 1882. The thorax being opened, the tumor was found attached to the right lung and pericardium. In loosening it from the lung a hole the size of a

nickel was cut. The lung collapsed at once, as the gauze was not put in quickly enough. The pericardium was then freed without accident, and the tumor removed. A piece of gauze was put over the pleural rent and allowed to come out of the wound by the other end. Hand pressure was kept up over the wound, while the flap was pulled down and compressed by the other hand externally. The inner hand was then carefully slipped out while the pressure was maintained by the other hand externally. The wound was then closed up and sutured. The result was good. He was discharged in four weeks.

Küster discusses the question of diagnosis in these cases, and asks whether syphilitic tumor, when not yielding to iodide of potassium, should be removed. He answers this question in the affirmative. He refers also to König's case, published in 1882, who discusses the opening of both pleuræ and refers to his experiment on animals.

CONSIDERATION OF THE RESULTS.[1]

Immediate results or results of the operation.

	Series I.	*Series II.*	
Died in consequence of the operation :			
Time not stated	0	1	
Within twenty-four hours	2	7	
Within forty-eight hours	1	1	
During first week	1	3	
During second week	0	2	
During third week	1	0	
During first month	1	0	
After five weeks	1	2	
Total deaths from operation	7	16	= 23
Recovered from operation	19	35	= 54
Result not stated in one case	1	...	= 1
	27	51	= 78
Percentages of mortality of known results	26	31.3	29.5

In many of these cases more than one operation were done on the same patient. In such cases the operations stated in the above table are those described in the detailed account of cases.

The following table exhibits the number of operations, the time patients lived after the first operation, after the last operation, and the final result as far as known :

[1] This table has been corrected to correspond with the transference of Case XVII. from Series II. to Series I.

NUMBER OF OPERATIONS DONE.

Series I.

No. of case.	Date.	Extra-pl.	Intra-pl.	Final results.	Incom-plete op.	Time living after first op.	Living after last operation.
1	1878	1	.....	Recovery.	.....	?	
2	1829	1	.....	"	?	2 years.	
3	1837	1	.....	"	.....	?	
4	1857	1	.....	"	.....	1 mo.	
5	1858	2	.....	Death.	.....	?	
6	1856	1	.....	Death from recurrence.	.....	6 years.	
7	1859	1	.....	Death.	.....	2 days.	
8	1863	1	.....	"	1	?	
9	1868	1	.....	Recovery.	.....	9 mos.	
10	1869	1	.....	Death.	1	24 hours.	
11	1871	1	.....	"	1	?	
12	1871	1	.....	"	1	1 mo.	
13	1878	1	1	"	?	9 mos.	5 months.
14	1882	1	.....	"	1	5 weeks.	
15	1882	1	.....	Recovery.	1	?	
16	1884	1	.....	?	1	?	
17	1885	1	.....	Recovery.	1	8 mos.	
18	1886	1	.....	Death.	1	Few days	
19	1889	1	.....	Recovery.	.....	2 weeks.	
20	1892	1	.....	"	.....	3 weeks.	
21	1892	1	.....	Death.	1	10 hours.	
22	1892	2	.....	Recovery.	1 (?)	?	$1\frac{1}{2}$ years.
23	1893	1	.....	"	.....	2 years.	No recurrence.
24	1896	$\frac{1}{2}$	.....	"	.....	3 mos.	4 months.
25	1896	1	.....	"	.....	5 mos.	No recurrence.
26	1896	1	.....	"	.....	?	?
		29					

Series II.

No.	Date.	Extra-pl.	Intra-pl.	Final results.	Incom-plete operations.	Time living after first operation	Living after last operation.
1	1818	?	1	.....	.....	?	
2	1855	.....	1	.....	.....	?	
3	1861	.....	1	Death.	.....	2 days.	
4	1861	.....	1	"	.....	4 "	
5	1861	.....	1 (?)	"	.....	1st week.	
6	1861	.....	1 (?)	"	1	13 days.	
7	1873	.....	1	"	.....	6 mos.	
8	1873	.....	1	"	.....	2 "	
9	1874	.....	1	Recovery.	.....	6 weeks.	
10	1878	.....	1	Death.	.....	?	
11	1878	1	1	Recovery.	.....	$2\frac{1}{2}$ years.	$1\frac{1}{2}$ years.
12	1879	.....	1	Death.	.....	2 days.	
13	1880	.....	1	"	.....	5 "	
14	1880	.....	1	"	.....	1 day.	
15	1883-88	1	2	Recovery.	.....	4 years. 10 mos.	1 yr. 4 mo. Inop. recur. Died 7 years after operation of pneumonia.
16	1884	(?)	1	"	.....	.....	2 years.
†17	1885	.....	1	"	.....	.....	4 years.
18	1885	.....	1	"	.....	.....	14 months.
19	1886	.....	1	"	.....	.....	1 year. No recur.*
20	1885	.....	1	"	.....	3 weeks.	

* Figures in ( ) indicate operations of not sufficient moment to justify tabulation.

† This case has been by mistake included in this table; it should be in series I.

Series II—*continued.*

No.	Date.	Extra-pl.	Intra-pl.	Final results.	Incomplete operations.	Time living after first operation	Living after last operation, with remarks.
21	1886–89	2	3	(1 recov.) (1 death.)	.....	3 years.	(14 days. Pleura opened at 3d, 4th, (and 5th operations.
22	1887	.....	1	Recovery.	.....	4 mos.	
23	1887	.....	2	Recovery after both.	.....	3 years.	Recurrence after last operation.
24	1889	.....	2	2 recov.	.....	8 mos.	Not stated.
25	1888	.....	2	2 "	.....	4 yrs. and 8 mos.	2 years 4 months. No recurrence.
26	1888	2	1	Death.	.....	24 hours.	
27	1888	.....	1	Recovery.	.....	5 years.	Q. and L.
28	1888	.....	1	Death.	.....	6 days.	
29	1889	.....	1	Recovery.	.....	3 years.	Q. and L.
30	1889	.....	1	"	.....	5 "	Q. and L.
31	1890	.....	1	"	.....	5 mos.	Two operations for gland. recurrence.
32	1890	.....	1	"	.....	Not stat'd	
33	1890	.....	1	"	.....	Not stat'd	
34	1891	.....	1	"	.....	13 mos.	Small op. for recur. in soft parts.
35	1891	.....	1	"	.....	14 "	Small subcut. recur. removed.
36	1891	.....	1	"	.....	?	Death from rapid recur.; op. declined
37	1891	.....	1	"	.....	6 mos.	
38	1891	.....	1	"	.....	3 "	No further information.
39	1893	.....	1	Death.	.....	Few hrs.	
40	1893	.....	1	Recovery.	.....	Not stat'd	
41	1894	.....	1	Death.	.....	24 hours.	
42	1895	.....	1	Recovery.	1	3 mos.	Recurrence.
43	1896	1	1	2 recov.	.....	Not stat'd	Recurrence.
44	1895	.....	1	Death.			
45	1896	.....	1	Recovery.	.....	Not stat'd	
46	1896	.....	1	"	.....	.....	No report.
47	1896	1	1	"	1	5 mos.	No report.
48	1896	.....	1	"	.....	.....	No report.
49	1897	1	1	Death	.....	48 hours.	
50	1897	.....	1	Recovery.	.....	1 year.	No subsequent rep.
51	1898	.....	1	"	.....	6 mos.	Recurrence.
52	1898	.....	1	"	.....	5 "	
		9	58				

Recurrence.

Series I.

Sarcomas: Known to have recovered from operation—
- Nothing known as to recurrence 4
- Recurrence (Cases 15, 17, 22, 24) 4
- No recurrence after two years (Cases 2, 23) . . . . . 2—10

Myxosarcochondroma: Known to have recovered from operation—
- Recurrence . . . . . 1— 1

Chondroma: Known to have recovered from operation—
- Nothing known as to recurrence (Cases 9, 25, 26) 3
- Recurrence (Cases 3, 5, 6) . . . . . 3— 6

Carcinoma: Known to have recovered from operation—
- Nothing known as to recurrence . . . . . 1— 1

18

Series II.

Sarcomas: Known to have recovered from operation—
Nothing known as to recurrence (Cases, 2, 22, 31, 32, 38, 45, 46, 48) . . . 8
Recurrence (Cases 15, 21, 24, 34, 36, 42, 43, 47, 51) 9
No recurrence after 1 year (Case 50) }
" " 2 years (" 16) }
" " 3 " (" 29) } . . . . . 5—22
" " 4 " (" *17) }
" " 5 " (" 30) }
Chondrosarcoma: Known to have recovered from operation—
No recurrence after 5 years (Case 25) } . . . . . 2— 2
" " 5 mos. (" 52) }
Myxochondrosarcoma: Known to have recovered from operation—
Recurrence (Case 23) 1
No recurrence after fourteen months . . . . . 1— 2
Chondroma: Known to have recovered from operation—
Nothing known as to recurrence (Cases 9, 33, 40) 3
Recurrence (Cases 1, 11) 2
No recurrence after 14 mos. (Case 18) } . . . . . 2— 7
" " 5 years (" 27) }
Myxochondroma: Known to have recovered from operation—
Nothing known as to recurrence (Case 20) . . . . . 1— 1
Carcinoma: Known to have recovered from operation—
Recurrence (Case 37) 1
No recurrence after one year (Case 19) . . . . . 1— 2
Total 36

SUMMARY OF RECURRENCES.

Series I.

	Recovered.	Result stated.	Recurrence.	No recurrence up to				
				1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.
Sarcoma and its combinations, including chondrosarcoma . . .	11	7	5	...	2			
Chondroma, simple . .	6	3	2	...	—	...	...	1†
Carcinoma	1	0						

Series II.

Sarcoma and its combinations, including chondrosarcoma . . .	26	18	10	1	1	1	1	2
Chondroma, simple . .	7	4	2	1	...	...	...	1
Myxochondroma . .	1	0						
Carcinoma	2	1	...	1				

A study of this table shows very little difference in mortality between the extrapleural operations and those which involved the opening of the pleural cavity. This seems on

* This case has been by error included; it should be in the table of extrapleural operations.

† In this case (Gibson's) recurrence took place only after six years, causing death.

first reflection a very remarkable circumstance, and all the more so since in cases of the second series the diaphragm was involved in the disease and included in the operative intervention, and in some cases portions of the lung were actually excised. A few observations here will easily set the matter right:

Of the non-penetrating operations, 12 or 46 per cent., were done prior to 1873, hence were pre-Listerian. They were done, too, at a time when surgical technique, apart from its present antiseptic or aseptic accompaniments, was yet in comparative infancy.

In the second series or operations involving the opening of the pleural cavity, on the other hand, of the 52 cases reported upon 9 only were done before 1878, or 17 per cent., and of these the deaths of two cases were probably (confessedly in one case, that of Langenbeck) due actually to the antiseptic used in the early days of the Listerian struggle with wound infection—a period in surgery when only the good effects of carbolic acid were believed in, its intoxicant power not being recognized, even though black urine continually warned of the patient's jeopardy.

This case has been rightly styled by Leonhard Meyer (*Inaug. Diss.*, Erlangen, 1889) as an "Opfer der Antiseptik."

This argument is further emphasized when we study the recurrences in the two classes of cases. Inspection of the tables of recurrences does not at once show marked difference in the two series, but this is to be partly accounted for by the lack of data in a large number of cases. One thing, however, is apparent, that in the intrapleural operations more cases are credited with long survival after operation than in the other series. This can only be accounted for by the fact that in the cases prior to 1878 imperfect technique was more conspicuous, and operations were not undertaken with that boldness which is, pre-eminently in this field of surgery, the assurance of thoroughness in operative work. It was not so much a difference in operative experience in the men doing the work, but rather a timidity born of the consciousness

that the operative field was new, comparatively untrodden, and the surgical world had not been convinced by the operative success of Richerand in 1818. Witness the fact, drawn from a study of these tables, that the second intrapleural operation (that of Sedillot) was not done until 1855, fully thirty-seven years after Richerand's famous case, unique, therefore, for the first half of the century.

A study of the tables reveals no striking difference as to mortality in either series between the malignant and the so-called innocent class of tumors—enchondromata.

Further, there seems almost as little difference in the tendency to recurrence—an observation which will naturally surprise those who have been in the habit of regarding the chondroma as benign. These tables show anything rather than benignancy. I desire to insist with some emphasis on this point. The extremely slow, therefore insidious, growth of these chondromata, lasting in some cases for years (witness the cases of Kappeler, twenty-five years; Morell-Lavellée, thirty-five years), and developing without pain, encourages individuals so afflicted to delay seeking the surgeon until the tumor by its size and weight becomes a burden and interferes with occupation; then, often, it is too late for radical extirpation, for extension of growth, directly or by metastasis, may have taken place, as in Roswell Park's case (Case XXVIII., second series).[1]

A strong argument in favor of early operation is that under circumstances not at all understood (perhaps an injury may have had some influence) these benign tumors take on malignancy due to their transformation in parts into sarcoma,

[1] A good example of metastasis of chondroma is that reported by Richet (Gaz. des Hôp., 1855, p. 378) of a man thirty-four years of age, operated on for a tumor (pronounced by Broca a chondroma) of the scapula, size of a child's head, noticed four years, stationary three years; autopsy two weeks after operation discovered on posterior surface of lung of same side a tumor size of a hazel-nut, and about thirty tumors from size of a millet seed to that of a nut scattered in both lungs. It is possible that at this early day the evidences of transition into sarcoma may have been overlooked. A good example of extension by direct growth is the following: Paget, in his "Surgical Pathology" (1853), reports an instructive case of chondroma of the heads of the ribs, the tumor projecting itself into the vertebral canal, producing complete paraplegia and death.

their rate of growth, and tendency to extension and metastasis being much accentuated.

Unquestionably our statistics would be much improved, both as to immediate and remote results, if the operative intervention could be undertaken at a time when radical operation would not involve the opening of the pleural cavity.

The enchondromata continue rarely as pure forms, showing, after a time in the greater number of cases, combinations which change their character and hasten their growth.

A study of the cases here presented will abundantly establish the malignant tendencies of chondromata. These qualities of malignancy may be thus enumerated:

1. Tendency to sarcomatous change.
2. Extension by contiguity (infiltration).
3. Metastasis to inner organs.

Chondroma, moreover, seems to be one of the more frequent tumors in this region, although this may not clearly appear from the tables, only thirty-two of the seventy-eight cases, or 41 per cent., having apparently begun as chondroma.

As to this comparative regional frequency, the carefully prepared statistics of Weber in his thesis on the subject (see Schläpfer von Speicher) may be quoted. (Weber collected 237 cases; to these Schläpfer added 23.) Of 260 cases in bones generally, only 8 were found in the ribs—that is to say, about 3 per cent. of all chondromas are located in the ribs.

It may be true, as Senn says, that it is not improbable, when a chondroma has invaded adjacent tissues, or metastasis has occurred, that there has already been transition into sarcoma. "The exciting causes," says Senn (*Tumors*, p. 84), "in effecting a transition of a benign into a malignant tumor are such local and general influences as transform mature cells into embryonic cells, and which at the same time render the surrounding tissues more passive to cell infiltration."

The local causes establishing this post-natal embryonic matrix, which is the starting-point of malignancy, may be thus enumerated (after Senn): Injury, prolonged or repeated irritation (rheumatism, in one case), and incomplete removal

of the benign tumor by excision or by cauterization. Age, of course, will have some influence in this transformation. Enough has been said to urge the early removal of benign tumors when operation is easy and safe and before such transformation has taken place.

There is a time in the life of all tumors when they are local and can be radically removed. Leonhard Meyer laments the late period at which operation is usually sought, and expresses the hope, naively, it is true, but with reason, that the laity will understand the importance of reporting early, so that the best results may be obtained.

I have spoken of the influence of irritation in the transformation of tumors. It might be interesting to note here the effect of traumatism. Senn has some instructive remarks on this subject. While traumatism alone is incompetent, acting primarily, to produce a tumor, still it "in exceptional cases may and does act as an exciting cause in the growth of a tumor by diminishing the physiological resistance of the injured tissues, or by causing irritation or inflammation in the immediate vicinity of a pre-existing tumor-matrix; or in more exceptional cases it furnishes both essential conditions for tumor growth—a post-natal matrix of embryonic cells and a diminution of physiological resistance in the immediate vicinity of the new matrix." (Senn on *Tumors*, p. 69.)

In my cases trauma is stated in only five cases of Series I. and in only fourteen of Series II. Of course, the evidence in many cases may be deemed inconclusive, but the fact is well attested and is accepted by most pathologists.

This statement applies not only to sarcoma, but to chondroma also. The truth of the statement as to chondroma is well illustrated by the experiment of Heyfelder, quoted by Schläpfer von Speicher from Virchow's *Archiv*, 1858, Band xiii. A four-year-old dog got a blow on the left side. After death a chondroma seven by four and one-half inches on the outer aspect, and another three and one-half by three inches on the inner surface were found. Instances in man of chon-

droma in various situations developed by trauma could easily be multiplied.

As to carcinoma of the ribs, it is doubtful if it ever occurs in the primary form, being usually consecutive to cancer of the breast.

The influence of age and sex are displayed in the following table:

AGE.

	First Class.	*Second Class.*
1. Decade from 1 to 10 years of age .	. . 1 (Case 6.)	0
2. Decade from 10 to 20 years of age .	. . 3 (Cases 15, 19, 26.)	7 (Cases 14, 16, 29, 40, 44, 45, 48.)
3. Decade from 20 to 30 years of age .	. . 4 (Cases 10, 18, 22, 27)	11 (Cases 9, 15, 24, 26, 28, 32, 39, 49, 50, 51. 22.)
4. Decade from 30 to 40 years of age .	. . 7 (Cases 4, 7, 9, 12, 16, 17, 24.)	12 (Cases 6, 12, 13, 23, 25, 27, 30, 31, 35, 42, 7, 33.)
5. Decade from 40 to 50 years of age .	. . 3 (Cases 3, 20, 23.)	8 (Cases 1, 11, 17, 21, 10, 36, 46, 43.)
6. Decade from 50 to 60 years of age .	. . 3 (Cases 13, 21, 25.)	2 (Cases 34, 38.)

SEX.

	Series I.	*Series II.*	
Male	18	34	= 52
Female.	8	14	= 22
Not stated	0	4	= 4
Total cases			. 78

DIAGNOSIS. The diagnosis of these parietal tumors is an interesting subject, but can only be briefly referred to here. Mistakes may be easily made, but if the history of development be given due weight, error is not apt to occur. As showing the difficulty of arriving at a conclusion without a consideration of the history of development, I mention the cases of Heyfelder (reported by Hermann Schüster, *Inaug. Diss.*, Erlangen, 1851), of a man, aged thirty-three years, who in January noticed a painless, movable, bean-sized tumor, which grew in five weeks to the size of a hen's egg, and by the end of March was as large as a female breast. It was found at autopsy to be a tumor filled with blood, due to

erosion of an intercostal artery connected with caries of the fourth rib.

For the operative diagnosis of the tumor it is only necessary to determine that the tumor can be removed; in other words, that it is not a thoracic aneurism, nor other tumor of mediastinal origin, making its way through the chest wall.

A case illustrating the difficulty of diagnosis in some rare instances is found reported in the London *Lancet*, 1859, vol. i. p. 489. The specimen was sent to the Pathological Society of London by Mr. Sharpley. It was removed from the body of an old man who had suffered with it for twenty-five years, and had been seen by some of the most eminent surgeons of London and the provinces. Some considered it a fibrous growth; others, like Mr. Liston and Mr. Key, thought it an aneurism. It was very large, and grew both within and without the chest, the two portions being connected through a hole in the sternum. It had large blood-vessels, and the man's diary stated that there had been a bruit.

The beautiful skiagraphic plates to be found in Murphy's article on the "Surgery of the Lung," in the *Journal of the American Medical Association*, July 23 to August 13, 1898, show that the X-rays are destined to render much valuable service in the surgery of the chest. The position of the heart, the diaphragm as it moves in respiration, the gradual expansion of the lung as the retained pleural air absorbs, can all be studied to a certain extent with the fluoroscope, and still better in the skiagrams, and as the apparatus becomes improved the delicacy of its definition will become more and more apparent. The prize essay on "Skiascopy of the Respiratory Organs," just published in the March number of the *Philadelphia Monthly Medical Journal*, indicates already some material advance in the near future.

The percentage of hemoglobin should be determined, a decided fall in amount indicating a tendency toward malignancy or the imminence of recurrence. See case of Mikuliez (XXXV.).

Treatment. At the outset the question should be considered whether these tumors, having reached a certain stage in development, had better be removed or left alone. As to carcinoma, the question is not so difficult, since these tumors, being secondary in character, do not offer the same justification for a formidable operation. While Richerand's famous case was the first intrapleural operation, and was in this sense an epoch-making event in the surgical world, and would have been accepted without question by surgeons as a justifiable operation if the character of disease had made recovery possible, still the rapid recurrence of the disease and the death of the patient only one month after having passed through such a trying surgical ordeal without an anæsthetic, caused the hand of the boldest surgeon to pause, while he reflected whether it would not have been better to have let the poor man die by the hand of God than to have subjected him to the torments of three ineffective mutilating operations.

Without doubt surgery was checked in its progress, for not another case, even operable in character, was done until Sedillot successfully attempted it in 1855; but, incontestably, Richerand deserves the credit for the demonstration that the opening of the pleural cavity can be successfully done. The seed had remained, and after many years, fortunately for this branch of surgery, blossomed into fruit. Few surgeons now would have the boldness to repeat under the same circumstances the experiment of Richerand,[1] notwithstanding the brilliant success of Schede, whose patient was alive and well one year after an extensive operation for recurrence after excision of a breast carcinoma; and of Finck, whose patient lived three years and eight months after an extirpation of a mammary cancer, in which he wounded the pleura, giving rise to a severe pyopneumothorax. In any case of secondary tumor one must, at all events, be sure before operating that there is not elsewhere another tumor. Regarding the difficulty of ascertaining whether a cancerous tumor is primary

[1] According to Plitt (Inaug.-Diss., Berlin, 1890), Richerand afterward declared that he would not again do this operation for cancer.

or secondary, Roulliés (*Thèse de Paris*, 1887–1888) quotes a communication made to him by Nicaise: "I have seen," says that able surgeon, "several cancers of the sternum, all of secondary origin, but once I did not find at first the primary cancer; and I asked myself if I were not in the presence of a primitive tumor, and if it were not proper to do an operation. In the meantime the patient fell unaccountably and sustained a spontaneous fracture of the neck of the femur, due to a cancerous nodule, confirmed by autopsy. The primary disease was a renal cancer, absolutely inactive, without apparent alteration of the urine."

If, however, a tumor be demonstrably primary in character, and there be reasons for believing that it has invaded no structure which cannot be removed, then an operation is indicated, and may be done if the condition of the patient shall justify it. A few carcinomas secondary to mammary cancer, then, and fibromas, chondromas,[1] sarcomas, and, exceptionally, gummata of the ribs and sternum, will fall into this category. An interesting problem in surgery was broached by Küster (see sternal cases), which has not yet been definitely settled, whether, as in his case, the surgeon would be justified in doing a costal or sternal resection for gumma which had resisted a thorough six weeks' course of iodide. In his case, although there was absolutely no history of syphilis and no other signs of gumma, a syphilitic tumor was suspected and the iodide tried thoroughly without effect on the neoplasm, whereupon extirpation was done, and its gummatous nature established on examination. The therapeutic test had led him into error, it is true, but its failure after adequate trial had, I believe, justified the operation. I learned through a personal communica-

[1] When one looks superficially at the question he is tempted to let these tumors of the chondroma type severely alone. Thus, of the fifteen cases tabulated by Schläpfer von Speicher, three had lasted 1 year and under (two were operated on with cure), two had lasted three years, two four years, two five years, two six years, one eight years, one twenty-five years, one thirty-five years, and one several years; but it must not be forgotten that chondroma of the ribs is very prone to undergo metamorphosis and to form various combinations which hasten their growth, and these changes are very prone to occur under the influence of trauma. (See Section on Transformation of Benign into Malignant Tumors.)

tion of one of the Fellows of the Southern Surgical and Gynecological Association of an equally interesting case of opposite character, in which, in the belief that a sternal tumor was a gumma, the antisyphilitic medication was persisted in for a considerable period, but without effect. The autopsy showed osteosarcoma of the sternum, which would have been amenable to operative treatment.

The tumor having been decided to be operable in character, the surgeon must determine beforehand how far he will carry his operative attack in his endeavor to get beyond the limits of the disease. Shall he stop at the pleura, or, having gone into the cavity, let the diaphragm be his *noli me tangere?* or will he proceed further, stopping at nothing short of the heart or the whole of one lung? These are questions difficult to answer, but I shall attempt to indicate the chief, at least, of the factors which aid in the solution of the problem.

It might be wisest, first, to consider the causes of death in the cases here reported. It will be profitable to consider only the second series.

These may be ranged under the following heads:

Shock: Weinlechner (14), Hahn (26), Park (28), Helferich (49)	4
Shock and hemorrhage: Koenig (39)	1
Shock and pneumothorax: Sheild (41), Quénu (44)	2
Hemorrhage and pneumothorax: Tietze (12)	1
Hemorrhage and Sepsis: Heyfelder (4)	1
Chronic sepsis: Israel (8)	1
Antiseptic irritation (capillary bronchitis): Leisrinck (13)	1
Carbolic intoxication: Langenbeck (7)	1
Pyopneumothorax: Schuh, (3) Wattmann (10)	2
Doubtful	2
Total	16

The ages of these cases ranged from ten years (Sheild's case) to sixty (Schuh's).

The cases showing shock were in order, beginning at the top—thirty-seven, thirty-three, ten, fifty-five, ten, and forty-nine years of age. Of the remainder the oldest case was that of Schuh, sixty years, dying in two days of pyopneumothorax. The others ranged between thirty-two and forty-six years of age.

Sex seems to have had even less influence in determining the fatal result. Thus, of the sixteen fatal cases only two were females (Langenbeck's and Israel's). The condition of the patient at the time of the operation is specifically stated in very few cases. Thus, Case XIII. (Leisrinck's) is said to have been pale and dyspeptic; Case XXVI. (Hahn's case), exhausted by repeated operations; Case XXVIII. (Park's case), debilitated by repeated operations for recurrent growths.

Even in cases which did not die the condition was at times so threatening that it will be very profitable to study all the cases in groups, in order to arrive, if possible, at some satisfactory solution of the phenomena observed.

Pneumothorax, Hemorrhage, and Shock. Without doubt the first is the most formidable complication attending operations which open the pleural cavity. Hemorrhage, whether from the intercostal arteries or the internal mammaries, may be prevented or controlled by multiple cartilage or rib resections and ligation, as done long ago by Langenbeck and Richter, or by clamp-forceps, suture-ligature, or tamponade, if the ordinary method of ligature cannot be carried out. It is worthy of remark just here that the bleeding from the intercostals in the course of the excision of a parietal tumor is often surprisingly little.[1] In my second case, for example, not a single intercostal vessel had to be tied. The lung itself bleeds little; suture-ligature and ligature of even the large vessels accompanying the bronchi, or putting on two large clamps, as was done by Helferich in his last case, may be justifiable in certain grave emergencies.

But the greatest danger, and the one most difficult to deal with, is pneumothorax. We shall now proceed to study this.

Study of the Phenomena Observed on Opening the Pleura. *Classification of the Cases according to the Severity of the Manifestations.* The following cases are thrown

[1] The absence of hemorrhage was one of the points made against Richerand by Nicod. He assumed because no intercostal bled, that this was the result of the progressing disease, enveloping and obliterating them; but this may not necessarily have been the case at all.

out because of insufficient data: Cases II., III., IV., V., VI., VII., VIII., X., XIX., XXVI., XLV.—eleven in all—except in so far as they may illustrate points mentioned in the histories.

The remaining forty-one cases may be grouped as follows:

1. Cases marked by little or no disturbance when the pleura was opened, either specifically so stated or whose clinical histories justify the assumption that the disturbances were slight: Cases of Tietze (XII.), Desguin (XXII.), Tietze (XXIX.), Alsberg (XXXIV.), König (XXXVI.), Zarubin (XXXVIII.), Sheild (XLI.), Marsh (XXXIII.), Alsberg (XXVII.), Trendelenburg (XX.), König (XL.), Tietze (XXI.), Heineke (XXIV.), Bardeleben (XXXI.), Mikulicz (XXXV.), Helferich (XLIX.).

2. Cases marked by only moderate disturbances when the pleura was opened: Cases of Cassidy (IX.), Maas (XVIII.), König (XXIII.), Park (XXVIII.), Bardeleben (XXXI.), Vautrin's second case (XXXVII.), Thompson (XLVII.), Faure (XLII.), Gauthier (LI.), Parham's second case (LII.).

3. Showing quite stormy manifestations, even threatening life: Richerand (I.), Fischer-Kolaczek (XI.), Leisrinck (XIII.), Weinlechner (XIV.), Krönlein (XV., second operation), Humbert (XVI.), Müller (XXV.), Vautrin's first case (XXX.), Witzel (XXXII.), König (XXXIX.), Karewski (XLIII.), Quénu (XLIV.), Bayer (XLVI., both), Doyen (XLVIII.), Parham's first case (L.).

The Nature of these Disturbances. In this discussion I have drawn freely upon the valuable work of Gerulanos. In all the cases the respiration was interfered with to a certain extent when the pleura was opened, being somewhat accelerated.

In the cases of Leisrinck (XIII.), Weinlechner (XIV.), and Müller (XXV.) the breathing and pulse were much inhibited. The patients were severely collapsed in seven cases, the pulse being small, scarcely perceptible in them all. Though in the fatal cases this is not so apparent, still in a

general way it may be admitted that the age, the condition of the patient, and the existence of complications, such as affections of the heart (König, XII., XXXIX.) and tuberculosis of the lung (Pfeiffer), will influence the termination.

The kind of tumor, its size, its extent, and its relations to the lung and pericardium will also be seen to have some influence.

A reference to the table will convince one that the greatest factors are the size of the opening and the time it remains open. Thus it will be seen that in Cases XI., XIII., XIV., and XV. the pleural defect was as large as a man's or a child's head. In all the other cases marked by stormy symptoms the opening was as large as the hand or as the palm of the hand, and in all these cases the tumor was large and its removal required some time, the patients all, with the exception of Cases XI. and XXXIX., being under forty-five years of age; all except XI. and XV. being male, and all being in excellent condition.

In the case of smaller pleural defects or merely tears the manifestations were not severe, since the pneumothorax was easily controlled by gauze tamponade. In some few cases (XXIV. and XXXI.) adhesions prevented the development of collapse. A specially remarkable case is that of Mikulicz (XXXV.), where, in a fifty-four year old patient, a large tumor was removed with excision of a piece of the diaphragm with almost no disturbance; and that of Maas (XVIII.) showing only a slight slowing of the pulse and respiration. These were both on the left side, low down and behind. In cases of the first class adhesions explained the absence of severe symptoms (König, XXI.), or the tumor was small.

Operations on the Lung and Diaphragm. Of the cases of the third class operations were done on the diaphragm in XIII. and XVI., and on the lungs in XIV., XV., XXV., and XXVIII. The case of Helferich (XLIX.), in which actually two lobes of one lung were excised in a boy, aged fifteen years, with slight pneumothorax, would seem to indicate the correctness of the assertion of Gerulanos that in the

cases now mentioned the disturbances were due less to the fact that the lung or diaphragm was involved in the operation than that the operative work took more time and kept the pleural wound open so much the longer. This is further shown by Case XXXI. and König's sternal case. It is well, if prolonged intrathoracic work must be done, to keep the cavity as far as possible packed with moist gauze.

The Side of the Thorax Involved. With rabbits (Gerulanos), right-sided pneumothorax is immediately fatal, because the left lung is a third smaller than the right. The oxygen-content of the aortic blood amounts, when one pleural cavity is opened—if the left pleura to 76 per cent.; if the right pleura to 58 per cent.

Of the cases in the third clinical class (showing stormy manifestations) the lung involved was: the right in nine cases; the left in five cases.

Of four cases with great defect, yet little disturbance, in three (XVIII., XXII., and XXXV.) the left, and in only one (XXIX.) the right was involved; and it is probable that adhesions partly explain this, for the age of the man was rather in favor of bad symptoms.

The explanation in this right-sided and left-sided pneumothorax seems to be twofold:

1. The lung thrown out (greater disturbance when the right).

2. As to which way the mediastinum is pushed by the pneumothorax.

Right-sided pneumothorax pushes the mediastinum toward the left, compressing the venæ cavæ and the thin-walled right *auricle*, while left-sided pneumothorax exerts its pressure on the more resisting right *ventricle*.

In the first case the sucking up of the venous blood from the cavæ into the right auricle is seriously interfered with.

In addition to these anatomical considerations must, of course, be taken into account the hemorrhage, the narcosis, and the circumstances surrounding the patient. Of great significance is the elimination of one lung from the work of respiration.

Reflex irritation, however, seems to be of more importance than the simple compression of the lung. Quénu and Longuet lay great stress on this point. The effect on the heart is partly reflex, partly due to direct pressure on the heart and great vessels (especially the great veins and right auricle) in right-sided pneumothorax. Witzel attaches some importance to the flexion of the great vessels. According to the investigations of Sackur on rabbits, the circulation through the collapsed lung is not diminished, rather, indeed, is increased.

This reflex effect is likely to be prolonged or intensified by pleural irrigation. Where the wound cannot be closed afterward, as in Weinlechner's and Helferich's cases, the fatal result may be largely attributable to this reflex disturbance.

Quénu and Longuet, in their very valuable article, give the following explanations of the varied manifestations of pneumothorax in different cases. I have grouped them, for greater convenience of reference:

1. Pulmonary retraction may be incomplete, on account of adhesions. These may be complete enough to shut off the pleural cavity, or only partial, the location of the adhesions being of great importance; or the lung may not contract, because less elastic from œdema, hepatization, or sclerosis, etc.

2. The effect of reflex irritation is of the greatest influence, as was shown in the case of a colleague of Quénu during his interneship, who, instead of making a vacuum in his syringe for aspiration, injected air, with the instant death of his patient.

The wide opening of the pleura by letting a large amount of air suddenly into the chest cavity intensifies the reflex effect.

A difference must be made between those cases which breathe calmly throughout the narcosis and those which show stertorous breathing from the start. In the former case when the pleura is opened the in-rush of air is much more effective in giving rise to the reflex irritation.

The Effect of Drainage. The question of drainage is one requiring earnest consideration. One must weigh the necessity of providing for the discharge of the secretion from the irritated pleura with the necessity of preventing

secondary pneumothorax. Quénu and Longuet suggest a middle course by the use of an apparatus similar to Bigelow's suction apparatus for the bladder after litholapaxy, so as to get drainage without admission of air. I believe if drainage is adopted other than into a vacuum, gauze should be preferred to tubes, as we know how a little piece of gauze will control pneumothorax and will at the same time permit of sufficient discharge. A study of Maas's case shows how, with satisfactory asepsis, the wound may be safely closed without any provision for drainage beyond leaving a small, dependent corner of the wound unsutured. Animal experiments accord with clinical observations, that the air is gradually absorbed. A study of the cases like that of Maas shows that the air in the cavity is rapidly absorbed, in his case by the fifth day. Even with two drainage-tubes (Krönlein's case) the pneumothorax disappeared rapidly. See also cases of Leisrinck, Müller, Alsberg (XXIV.), and Bardeleben (XXV.). Bouveret and Schede, says Gerulanos, have called attention to the valvular action of a tightly applied dressing, and Aufrecht broached the theory that the collapsed lung will expand in every inspiration when the chest opening is smaller than a main bronchus.

The Limits of Operation. Although the result was good in Humbert's case, he was so impressed with the dangers and difficulties of the operation when the diaphragm was involved in the disease that he counselled deciding against operation if it were possible to determine beforehand that the diaphragm would in all probability have to be attacked with the knife.

Let us examine the cases and classify them so as to see what our limitations are:

Costal operations, extrapleural (Case 20), in which the pericardium was opened; there was immediate fall in the pulse, but he recovered 1
penetrating, pericardium opened 9
diaphragmatic adhesions separated (Cases 12 23) 2
adhesions between lung and tumor separated (Case 28, Park), died 1

Costal operations, diaphragm incised or portions excised	4
case of Leisrinck, Mikulicz, and Humbert, recovered	3
case of Hahn, died	1
portions of lung excised	6
lower and middle lobes excised (Helferich), died	1
limited portions (Cases 2, 15, 25, 40), recovered	4
(Case 14), died	1
Sternal cases (see table). Both pleurae and pericardium opened (Case 2), recovered	1

This was König's remarkable case.

A consideration of these results and the phenomena observed in the course of operation justifies the conclusion that the trouble rather arises from the prolongation of the operation by reason of the intrapleural manipulation than on account of the severity of the procedures.

The remarkably successful experiments of Biondi on animals, in 1882, in which he extirpated the right lung in twenty-three, with twelve recoveries; both apices in three, with three recoveries; middle lobe in one, with one recovery, and the almost equally good results of Zakharwitch (Murphy's paper), demonstrated that, at least in animals, there was almost no limit to the possibilities in operations on the lung. The recovery of Milton Antony's patient (in Georgia) in 1821, in whom he had resected two ribs and scooped a tumor out of the lung (this was the operation which Dieffenbach criticised afterward so severely), and the equally successful case of Péan, in 1861 (Murphy is wrong in stating that this was a tumor of the ribs; Paget quotes the case from the original article as one simply of tumor of the lung), were the first pneumectomies on the human. Since these the lung has been attacked in a considerable number of instances with success. Witness the case of Tuffier in 1891, done with the stripping of the parietal pleura; Mr. Lowson, of Hull, in which he resected the apex of the right lung after preliminary injection into the pleural cavity of air through a trocar, connected with a Junker's bottle and bellows,[1] and the cases referred to in this paper. These cases have brought the lung into the field of operative surgery, and though no case is on record where the whole lung, nor, indeed, a whole lobe, has been removed in man with success, yet the results in animals certainly seem to indi-

[1] Lowson, not Lawson, as some have it. Brit. Med. Journal, June 3, 1893, p. 1152.

cate the possibility in the future of more extensive work. The excision by means of the V-shaped incision of Schmid (1881), with sewing over of the lung stump, so as to cover in the bronchus, in conjunction with the Fell-O'Dwyer apparatus for forced respiration, and the proper closure of the parietal wound, will yield better results than was obtained by Helferich in the case reported in this paper (Case XLIX.), in which he resected two whole lobes of one lung with only slight circulatory and respiratory disturbances, and without any artificial respiration. He utilized a portion of the lung in covering the root-stump. Murphy has demonstrated by experiments on dogs that the root of the lung may be grasped not only without bad effect, but actually with decided improvement of all the symptoms due to the pneumothorax. In a dog, too, which lived eighteen weeks after extirpation of the three lobes of the right lung, he showed that there was definite closure of the large bronchus tied before the lung was cut away.

Finally, Murphy has given us very satisfactory physiological argument to justify our expectation that the patient may be able, at least during the operation, to dispense with one whole lung.

"Our extreme respiratory capacity," he says, "is 3358 c.c. In an ordinary exchange it is 114 c.c. at rest to 360 c.c. in exercise; therefore, the extreme capacity is equal to at least ten times the ordinary exchange. Pathologically, we recognize that with one lung entirely disabled by pleuritic effusion, and the capacity of the other lung greatly diminished by displacement of the mediastinal septum, the respiratory change is still able to sustain life. These physiological and pathological facts prove that with our surgical technique sufficiently advanced an entire lung may be removed, as the body can dispense with it." "The accepted theory," he continues, "is that the exchange between lungs and blood is effected by physical and chemical means, the most important of which is diffusion. The surface through which this diffusion takes place is ninety square metres, and through this there are diffused 300 c.c. of carbon dioxide and about the same quantity of oxygen per minute in ordinary respiration."

"The question which concerns the surgeon in this relation is how much of the ninety square metres of this surface can be dispensed with suddenly, and how much can be dispensed with slowly, the former by amputation or compression of the lung, the latter by disease processes. Clinical experience shows that one lung may be suddenly rendered entirely functionless without materially embarrassing respiration, as in pneumothorax and hematothorax, as I have demonstrated experimentally and therapeutically by nitrogen gas injections into the pleura." A case particularly illustrating this point is that of Heineke (Case XXIV.), in which, although the right lung was practically eliminated from the work of respiration, there was no noteworthy disturbance of either circulation or respiration.

We may then feel justified when we start out to remove a tumor of the thoracic wall, in doing a radical extirpation of the disease, provided that it does not carry us beyond the capacity of the individual patient to endure the operative attack.

Suggestions for the Prevention of Pneumothorax.

1. Early operation, before the tumor is of great size.

2. Preliminary adhesions (see Billroth's and Gauthier's cases).

3. Substitution of temporary hydrothorax for pneumothorax. (See Witzel's case, XXXII.)

4. Injection of sterilized air (Lowson, *British Medical Journal*, June 3, 1893).

5. Tuffier and Hallion's intubation method.

6. Quénu and Longuet's intrabronchial tension, with the aid of compressed air to neutralize the mediastinal vacuum.

7. Doyen's method.

8. Fell-O'Dwyer apparatus (see Parham's case, LII.).

9. Stitching up the lung to the margin of the thoracic wound, as practised by Tuffier, Bayer, and myself. Quénu objects to this as causing emphysema, but I believe the objection of little moment.

10. Obturation of the wound of the pleura, (*a*) by the finger; (*b*) by a compress; (*c*) by suturing the flap. Some-

times by taking a flap from a distance with a pedicle (as Vautrin did in his first case) the wound may be closed.

11. Freeing the parietal pleura by dissection, sinking it into the chest, and uniting it by sutures with the visceral layer, as practised by Vautrin in his second case (XXXVII.).

12. The patient may be directed at the termination of the operation—when the wound has been closed, except where a small tube is inserted—to take a deep inspiration to force the air out of the pleural cavity; at this moment the tube is quickly withdrawn and the wound hermetically closed.

This was done in Marsh's case (XXXIII.).

13. The air may be gotten rid of, partly at least, by aspiration, as in my second case.

The Treatment of Shock and Hemorrhage. In this class of cases the treatment of shock will not differ materially from its treatment in other operations. Saline infusion will render conspicuous service in chest surgery. To get the best results it must be given intravenously, and must always be given as hot as can be borne, say 115° to 120°, especially when given for shock.

It strikes me that the new surgical table of Pyle, described in a recent number of the *New York Medical Journal*, equipped as it is with every provision for an emergency, and especially its arrangements for keeping the patient warm, will prove particularly useful in intrathoracic surgery.

I cannot leave this subject without again paying tribute to the Fell-O'Dwyer apparatus for forced respiration.

Matas has, in his paper referred to, given a history of the evolution of this admirable apparatus, and has indicated its wide range of usefulness in chest surgery. The assistance rendered me in my second case was so striking that I can without hesitation indorse every word that has been said in its favor. Indeed, so imbued am I with its great value that I believe no surgeon now would be justified in attempting a thoracic resection without having the Fell-O'Dwyer apparatus at hand. I believe it will revolutionize this field of surgery, making possible operations in the chest that would otherwise be clearly too hazardous to be justified.

RESECTION OF THE STERNUM FOR TUMORS.

No.	Reference.	Sex and age	Nature of tumor.	Operation.	Complications.	Result.	Remarks.
1	Holden, Brit. Med. Journ., 1878, ii. p. 358.	F. 52	Sarcoma of gladiolus partly calcified.	Imperfect removal of tumor only to posterior surface of the bone.	.....	.....	The more successful methods of modern surgery were hardly then in vogue.
2	König, Centralbl. f. Chir., 1882, No. 42.	F. 36	Sternal sarcoma.	Part of manubrium, the gladiolus and the ribs (six) from second downward (left), and ends of cartilages on the right.	Both pleuræ and pericardium opened; both internal mammaries tied.	Recovery; died 2 yrs. later from recurrence in lungs.	Only slight respiratory trouble; great frequency of pulse; duration of operation 3 hours; collapse slight at termination.
3	Küster, Berlin klin. Woch., 1882, p. 127.	M. 30	Gumma of gladiolus.	Right half of gladiolus and 3d and 4th ribs.	Right pleura opened, size of 10-pfennig piece.	Recovery.	
4	Pfeiffer, Beitrag. z. Kennt d. Sternal Tumoren. Halle, 1884.	M. 45	Sarcoma of gladiolus.	Gladiolus and 2d, 3d, and 4th ribs; right and left side.	Right pleura opened and pericardium exposed.	Died 6th dy. pericarditis, hemothorax and pleurisy; fresh tubercles in lungs.	Other tumors found at autopsy on 4th rib, pubes, in aortic glands, liver, and right kidney.
5	Bardenheuer, Deutsch. med. Woch., 1885, xi. p. 688.	F.	Fibroid of manubrium.	Manubrium, two-thirds of clavicle, 2d and 3d ribs.	.....	Recovery.	Tumor extended to larynx, gladiolus, and both clavicles.
6	Ibid.	M.	Sarcoma of clavicle.	Manubrium, two-thirds of clavicle, 1st and 2d ribs.	Int. jugular torn; tied rt. innominate, subclavian, int. and ext. jugular veins.	Recovery.	
7	Ibid.	...	.....	Manubrium.	.....	Recovery.	No other details given.
8	Ibid.	...	.....	Manubrium.	.....	Death.	No other details given.
9	Ibid.	...	.....	Manubrium.	.....	Death.	No other details given.
10	Ibid.	F.	Retrosternal fibroid.	Manubrium, part of gladiolus, 1st and 2d ribs, and inner end of clavicle.	.....	Recovery.	
11	Ibid.	...	Retrosternal fibroid.	" " "	.....	Recovery.	
12	Jaenel, Resectio sterni Inaug. Diss., Erlangen, 1887.	F. 12	Sarcoma of manubrium.	Manubrium, 1st and 2d ribs	Retro-sternal tissues involved, and cauterized with nitric acid and cautery.	Recovery.	No return after a year.
13	Dudon. Jour. de Med. de Bordeaux, June 1, 1890.	F. 28	Enchondroma of gladiolus.	Manubrium, part of gladiolus, and 1st and 2d ribs.	Internal mammary exposed but not injured; suppuration of wound.	Recovery.	Tumor first removed by oper. 27 mos. before; 3 small nodules removed 8 mos. later from pectoral and sterno-cleidomastoid; ascribed to bringing elbows forcibly together behind her back.

No.	Reference.	Sex and age	Nature of tumor.	Operation.	Complications.	Result	Remarks.
14	Mansell, in Lindon's paper.	M. 55	Myxo-sarcoma of gladiolus	Gladiolus and 2d, 3d, and 4th ribs.	None.	Death 15th day from pneumonia	
15	Graves, Med. News, Mar. 4, 1893, p. 241.	F. 44	Sarcoma of gladiolus.	3 x 3½ inches gladiolus and 2d to 5th ribs.	None.	Recovery.	Right breast removed for carcinoma 22 months before.
16	Doyen, Arch. Prov. de Chir., 1895, iv. p. 633.	M. 37	Sarcoma of manubrium.	Manubrium, parts of both clavicles, and 1st rib.	None.	Recovery.	Rt. and lt. brachiocephalic vein disclosed; lungs and heart seen; but neither pleura nor pericardium opened.
17	Mynter, Annals of Surgery, 1891, xiii. p. 96.	F. 20	Melano-sarcoma of gladiolus.	Gladiolus (6 sq. in.) from 3d nearly to 6th ribs, and 3d, 4th and 5th ribs.	None.	Recovery.	Weight bet. ½ and ¾; removed, also glands from both axillæ and subclavian glands; pericardium exposed. Ascribed to injury from handle of broom. Dr. Mynter kindly writes me that patient died in Ireland a year later, probably from recurrence.
18	Keen, Med. & Surg Reporter, March, 1897, vol. lxxvi.	F. 28	Sarcoma manubrium and sternocleidomastoid.	Manubrium, ½ clavicle, 1st rib, and ⅛ sternocleidomastoid.	Suppuration of wound; drainage by Cathcart's method.	Recovery.	No recurrence after 15 months.
19	Ibid.	F. 44	Carcinoma of manubrium and gladiolus.	Part of the manubrium and the gladiolus and 2d and 3d ribs.	Carcinoma of both breasts.	Recovery.	Lt. breast removed March 1, 1891; recurrent nodule in scar May 20, 1893; right breast and parts of sternum Mar. 22, 1894; recurrence and death Aug. 1894.
20	Weinlechner, Bericht d.k.k. Krnkanstl. Rud. Stift. in Wien (1871), 1873, p. 124.	M. 58	2 tumors; primary, chondroma; sec'dary, colloid sarcoma; hard tumor 50 years' duration, soft tum. 3 years.	Soft tumor removed with knife, the hard one with gouge to level of sternum.	None.	Death 5th day from pyemia.	Extended from anterior surface of manubrium to left axilla; the soft tumor was in mammary glands, hard one on manubrium.
21	König, Campe, Inaug. Diss., 1894.	M. 59	Sarcoma, right side, fist size.	Resection of sternum 2d to 5th ribs, both sides; opening in right pleura 5 mark size.	None.	Died; brown atrophy of heart.	No collapse of lung (adhesions?); respiration regular, pulse remained good; dyspnœa and feeble heart-action subsequently.

The above table is taken, with some alterations and additions, from Keen's article in the *Medical and Surgical Reporter*, 1897, lxxvi. p. 393. The last two cases have been added. It is worthy of note that in one of Keen's cases (Case XVIII.) Cathcart's method of drainage by intermittent siphonage was employed with admirable effect in keeping the mediastinal space dry. Immediate result: Recovered, 14; died, 6; not stated, 1; 30 per cent. fatal. Case II. both pleura and pericardium opened, recovered, as did also Case III., with right pleura opened, but Case XXI., right pleura opened, and Case IV., both right pleura and pericardium opened; both died. Age may have had something to do with the death of Case XXI., but the heart trouble evidently had some effect, and tuberculosis was evidently a factor in Case IV.

THIS TABLE INCLUDES ONLY

No.	Operator; year.	Bibliographic reference.	Sex and age.	Cause and duration.	Size and situation.	Rapidity of growth.	Histological classification.
1	Richerand, 1818	Paper before Royal Academy, translation by Thomas Wilson.	Adt. 40, French surgeon of Nemours.	3 years.	Large; 6th and 7th ribs, left side.	Rapid; 2 oper. before Richerand's.	Carcinoma.
2	Sedillot, 1855	Deutsch. Zeitsch. für Chir., Oct., 1898.	.....	.....	.....	.....	Sarcoma or carcinoma.
3	Schuh, 1861	Leonhard Meyer, Inaug. Diss., Erlangen, 1889.	M. 60	.....	Reaching from 3d to 7th ribs, and from left sternal edge to axillary line: left side.	.....	Chondroma.
4	Heyfelder, J. F. 1862	Beiträge zur genaueren Kenntniss der Thoraxgeschwülste. Berlin klin. Woch., 1868, v. 369.	M. age not stated.	Fracture of 7th and 8th ribs one yr. before.	13 in. in breadth, 11 in. vertically; right side.	Rapid.	Chondroma.
5	Heyfelder, J. F. 1860	Ibid.	.....	10 years.	Filling space from vertebral column to sternum.	Slow at first, then rapid.	Chondroma.
6	Heyfelder, J. F. 1861	Ibid.	M. 33	10 years; breast inflammation	Size of fist; right side.	Slow.	Chondroma.
7	Langenbeck, 1873	Rep. by Israel, 8th German Congress for Surgery, 1879, p. 45.	F. 32	.....	Size of two fists; left side.	.....	Sarcoma.
8	Israel, 1873	Langenbeck's Arch. f. kl. Chir., 1887, Bd. xx. p. 26	F.	.....	Elastic tumor of mamma size; right side.	.....	Sarcoma.
9	Cassidy, 1874	Canada Lancet, 1874–1875. Rep. by Sylvester.	M. 29	6 years.	From size of pea grown to be size of man's fist; right side.	.....	Chondroma.
10	Wattmann, 1878	Albert's Lehrbuch der Chir.	Unknown.	Unknown	Anterior chest-wall.	.....	Chondroma.
11	Kolaczek-Fischer. 1878	Deut. Gesllsch. f. Chir., viii. 2 x, p. 80. Reported by Kolaczek.	F. 48	4 years.	Left side of chest, extending from clavicle to costal arch.	.....	Chondroma.
12	Tietze, 1879	Deut. Zeitschrft. f. Chir. 1891, Bd. xxxii. Rep. from Fischer's Clinic.	M. 46	Kick of hind foot of horse 3 yrs. before.	Size of child's head; right side.	.....	Sarcoma.
13	Leisrinck. 1880	Langenbeck's Arch., Bd. xxvi. Plitt's Inaug. Diss., Berlin, 1890.	M. 37	Blow given 6 months previously.	Extending from 5th rib to lower border of thorax, and from edge of sternum to lower angle of scapula; right side.	Rapid.	Sarcoma.
14	Weinlechner 1880	Wiener med. Woch., 1882, pp. 20 and 21.	M. 37	Noted for 4 years.	Size of man's head; 3d to 5th ribs of right side.	.....	Myxochondrosarcoma.
15	Krönlein, 1883–88	Deut. Zeitschf. f. Chir., 1893, p. 37. (Müller's article.)	F. 18	Noted 8 months.	Reached size of child's head.	Rapid.	Sarcoma.

INTRAPLEURAL OPERATIONS.

Operation, anæsthetic, duration.	Size of pleural opening.	Phenomena on opening	Management of.	Drainage and suture.	Remarks.
Crucial incision, resection of 6th and 7th ribs ; no anæsthetic.	8 sq. inches	Pneumothorax, great anxiety and oppression.	Closed with hand ; oil compress.	None.	Recovery ; discharged healed on 27th day. Death from recurrence 1 month later.
.....	Size not stated.	.....	.....	.....	Recovery. Remote result not stated.
.....	Finger puncture.	Pneumothorax.	Obturated with finger ; soft parts dropped over wound ; compress.	Partial suture.	Died 2 days after operation.
7th and 8th ribs supporting tumor resected together with involved pleura.	Corresp'nding to 7th and 8th ribs.	.....	.....	.....	Died 5 days after operation.
.....	.....	.....	.....	.....	Died in first week.
Exposed 2 to 3 in. of 4th rib ; pleura dissected loose.	.....	.....	.....	.....	Died on 13th day.
Involved two ribs and corresponding costal pleura.	.....	.....	.....	.....	Died from carbolic intoxication 3 months later.
.....	Pleura torn in two places.	.....	.....	.....	Death followed after 3 months from exhaustion.
.....	Finger puncture.	.....	.....	.....	Recovery.
.....	.....	.....	.....	.....	Death from pyopneumothorax.
4th, 5th, 6th, 7th ribs and subjacent pleura.	Defect in pleura size of child's head.	Dyspnœa.	Wound sutured and drainage tube ; salicylic acid solution used to wash out pleura.	.....	Recovery. Recurrence one year later ; death.
10 cm. of 6th, 7th, 8th, 9th ribs resected.	Pleura torn separating diaphragm from tumor	Dyspnœa slight.	.....	Wound sutured and drained.	Death second day ; adhesions.
6th and 7th ribs resected.	.....	Collapse ; pulse and respiration bad.	Ether injections ; Faradization of phrenics.	Wound washed with salicylic solution and sutured with two large drains.	Died on fifth day.
3d, 4th, 5th ribs resected with involved pleura.	Pleura widely opened.	Severe collapse.	.....	.....	Death after 24 hours.
6th rib resected.	.....	Collapse and cyanosis.	Rapid completion of operation.	No flaps ; wound packed.	Six months later piece of chest-wall, site of pain of 1st'd, removed together with a growth in lung the size of walnut ; May, 1887, recurrence 6th rib resected. August, 1888, recurrence in region of former operation. Died in 1889, of pneumonia.

No.	Operator; year.	Bibliographic reference.	Sex and age.	Cause and duration	Size and situation.	Rapidity of growth.	Histological classification.
16	Himbert, 1884	Revue de Chir., 1886, vol. vi. p. 297.	M. 21	Operated on twice in 1883.	....	.....	Sarcoma.
17*	Helferich, 1885						
18	Mass, 1885	Langenbeck's Arch. f. kl. Chir., 1886, xxxiii, p. 814.	M. 42	15 years before had a blow from heavy stick	First size of hen's egg, afterward grew larger.	Slow at first, then rapid.	Chondroma
19	Schede, 1882-85	Schede's Report at Hamburg Med. Society, May 18, 1886.	F.	Operated on in 1882.	....	.....	Carcinoma.
20	Trendelenburg, 1885	Leonhard Meyer, Inaug. Diss., Erlangen, 1889. Baldus, Inaug. Diss., Bonn.	M. 61	.....	Tumor seated on anterior aspect of left thorax, semi-spherical in shape.	.....	Myxochondroma.
21	Tietze, 1886-89	Deut. Zeitschft. f. Chir., 1891, Bd. xxxii.	M. 66	Fall, bruising right side, in 1884.	Size of female breast.	Slowly, and with pain.	Spindle-celled sarcoma.
22	Desquin, L. 1887	Bulletin de l'Acad. Royale de Méd., Belgique, iv. s Tome ii., 1887.	M. 41	.....	At first small, but after two operations grew rapidly; right side.	Slowly, and then rapidly and with pain.	Sarcoma.
23	König, 1887	Gerulanos, and Paget's Surgery of Chest, 1896.	F. 26	Rib broken 1½ years previously.	Size of fist, over 6th to 9th ribs.	.....	Chondromyxosarcoma.
24	Heineke, 1889	Leonhard Meyer, Inaug. Diss., Erlangen, 1889.	M. 31	In 1887 fell strik'g side heavily.	Size of fist, on lower part of thorax.	Rapidly and painfully.	Sarcoma.
25	Müller, 1888	Paget's Surgery of Chest, p. 109.	M. 24	Noted for 4 years.	From 4th to 7th ribs, from near sternum to near axillary line.	.....	Chondrosarcoma.
26	Hahn, 1888	Deutsche med. Woch., 1888, No. 50, p. 1034.	M. 33	Had been operated on twice in 1888 before.	Size of two fists.	Rapid.	Chondrosarcoma.
27	Alsberg, 1888	Riesenfeld in Deutsche med. Woch., 1889, p. 321.	F. 22	....	First noticed when of a walnut size, grew to be size of goose egg; left side.	Slow growth.	Chondroma.
28	Roswell Park 1888	Annals of Surg., 1888, vol. viii. pp. 254-57.	M. 33	Noticed a nodule 20 years ago on left leg, removed; returned, amputated; growth size of hen egg now appeared on left nipple.	.....	.....	Spindle- and round-celled sarcoma.
29	Tietze, 1889	Fischer's Surgical Clinic in Breslau. See Case 12.)	F. 28	Blow on lt. breast at 19; a hard lump developed.	Size of man's fist, 11 cm. length 15 cm. breadth. 12 cm. height.	Slow, then rapid.	Sarcoma.

* This case should have been included among the extra-pleural operations.

Operation, anæsthetic, duration.	Size of pleural opening.	Phenomena on opening.	Management of.	Drainage and suture.	Remarks
7th, 8th, 9th ribs resected.	Large.	.....	.....	Sutured, and drain left in inferior angle	Recovery.
11 cm. of 9th, 10th, & 11th ribs with corresp. pleura resected; chlorof.	.....	Mild.	.....	Wound closed with two rows of sutures.	Recovery.
Portion of thorax wall removed.	.....	.....	....	.....	Recovery.
.....	.....	.....	.....	Drain put in and wound sutured.	Discharged cured after 3 weeks.
4th and 5th ribs resected.	.....	.....	.....	.....	Recovery; July, 1887, small recur.; Dec. 14, recurrence, with gangrene of foot, which was removed. Feb. 1889, recur.; death.
8th and 9th ribs with adherent pleura resected.	.....	Mild.	.....	... .	Recovery.
8th rib resected with adherent pleura.	Freely opened.	....	.....	.....	Recovery. Recurrence three years later; recovery.
7th, 8th, and 9th ribs resected with adherent pleura.	.....	Mild.	Moss pillow dressing	Sutured, and place left for drainage.	Discharged. Recur'nce July, 1888; operation; recovery.
4th, 5th, and 6th ribs resected with adherent pleura and portion of diseased lung.	Gap in pleura large as a saucer.	Stormy.	Injections of ether and camphor.	.....	Recovery. Recurrence three and a half years after; operation; recovery.
6th, 7th, 8th, 9th, and 10th ribs, and piece of peritoneum, size of palm of hand, resected.	Pleura extensively opened.	.....	....	.....	Death a few days after.
8th rib resected with adherent pleura.	.....	Mild.	.....	Sutured, with iodoform gauze drain.	Recovery.
4th, 5th, 6th, and 7th ribs with thoracic attachments, resected. Ether.	.....	Mild.	.....	Sutured, and antiseptic compress.	Death.
5th rib resected with pericardial and pleural adhesions.	.....	Mild.	Pleural suture.	Sutured, and iodoform dressing	Recovery.

No.	Operator; year.	Bibliographic reference.	Sex and age.	Cause and duration.	Size and situation.	Rapidity of growth.	Histological classification.
30	Vautrin, 1889	Huitième Congrès de Chir., Lyon, 1894.	F. 19	Rt. breast enormous neoplastic mass, observed only 6 months.	It extended from sternal line to the axillary border of scapula and from clavicle to the last rib.	Rapid.	Sarcoma.
31	Bardeleben, 1890	H. Plitt, Inaug. Diss., Berlin, 1890.	M. 38	Fell on ice, struck side heavily, in 1889, 6 wks. before admission noticed several lumps in this region.	Row of tumors, the lowest on 9th rib, walnut size; the highest close to mammary line at 6th rib; bean size.	Rapid.	Sarcoma.
32	Witzel, O. 1890	Centralb. f. Chir., 1890, xvii, 523.	M. 30	.....	Size of fist, situated over 10th and 11th ribs on right side.	Slow, then rapid.	Sarcoma.
33	Marsh, 1890	Brit. Med. Journ., June 14, 1890.	F. 20	For 2 years noticed lump on chest.	Growth measures 3 in. in diameter, situated over sternal ends of 3d and 4th ribs.	Slow.	Chondroma.
34	Alsberg, 1891	Caro, Deutsche med. Woch., Jan. 1893, No. 3, p. 57.	F. 31	For nearly 3 months.	Fist size; occupied space between clavicle and 4th rib and extended from right parasternal line to anterior axillary line.	Rapid.	Sarcoma.
35	Mikulicz, 1891	Reported by von Noorden, Deutsche med. Woch., 1893, xix p. 346.	M. 54	4 years.	Began size of hen's egg; at time of operation 78 cm. in circum. 35 cm. vert. meas. 26 cm. ant. post.	Slow, then rapid.	Myxochondrosarcom. cysticum.
36	König, 1891	Paget's Surgery of Chest, Case 21, p. 180.	M. 34	Only 6 wks.	Size of large apple, situated over 7th rib in axillary line.	Rapid.	Sarcoma.
37	Vautrin, 1891	Huitième Congrès de Chir., 1894, p. 162.	F. 16	Vautrin operat'd on her in Oct. 1890; recurrence 6 mos. later, came for 2d oper. Dec. 1891.	.....	.....	Carcinoma.
38	Zarubin, 1891	Jacobson's Oper. of Surgery, 1897, p. 581.	M. young.	7 years' standing.	21 cm. horizont. 19 cm. vertic'ly; right side of chest larger than adult head, weighed 6 lbs.	Slow.	Sarcoma.
39	König, 1893	Paget's Surgery of Chest, No. 23, p. 180.	M. 55	6 or 7 years.	4th to 7th ribs, right side.	Slow, then rapid.	Chondroma.
40	König, 1893	Ibid. p. 170.	M. 2	10 years.	Size child's head; right side in front of shoulder from 2d rib to nipple.	Slow, then rapid.	Chondroma.

Operation, anæsthetic, duration.	Size of pleural opening.	Phenomena on opening.	Management of.	Drainage and suture.	Remarks.
Chloroform. Operation lasted 1 h. 30 m. 3d, 4th, 5th, 6th, and 7th ribs resected; wound measured 25 cm. in its transverse diameter, and vertically from a point situated 3 cm. from clavicle to 8th rib.	8 cm. by 6 cm.	Several syncopes followed.	Injections of ether.	Wound united with silkworm-gut leaving an opening 5 cm. in diameter; flap from axilla utilized.	Recovery.
Operation lasted 90 min. 7th, 8th, and 9th ribs resected.	.....	Nothing alarming.	.....	A large drain put in, and wound sutured; recovery.	
Morphine-chloroform anæsthesia.	.....	Cyanosis appeared with dyspnœa at opening of pleura.	Cavity filled with warm boric solution; drawn off.	Sutured.	Recovery. Heart suffered more than respiration.
.....	3 inches of pleura.	Mild.	.....	Sutured and drainage tube put in.	Recovery. Expulsion of air by forced expiration.
.....	5 mark piece.	Mild.	Wo'nd stuff'd with iodoform gauze and closed by sutures, a gauze drain having been put in.	.....	Discharged. Recur'nce in March, May, and June, and died Nov. 1892, of inoperable recurrence.
Morphine-chloroform, and lasted ¾ h. 7th, 8th, 9th, and 10th ribs resected.	Large, with piece of diaphragm.	No bad symptoms.	.....	.....	Recovery.
.....	.....	No serious dyspnœa.	.....	.....	Recovery. Rapid recurrence and death.
Chloroform. 4th, 5th, and 6th ribs resected.	3½ cm. opening in pleura.	Adhesions, only temporary embarrassment.	.....	Parietal and visceral pleura united.	Recovery. Recurrence six months after operation. Woman refused further operation.
Huge mass removed, and 7th, 8th, and 9th ribs resected.	Large.	No serious disturbance.	Wound cleansed with gauze soaked in a 1 per ct. solution of boric acid.	Suture and drainage tube inserted.	Recovery.
5th and 6th ribs resected.	.....	Lung collapsed.	.....	Pleura sutured, hole left for drainage.	Shock; death in a few hours.
3d rib cut thro', growth cleared with finger, piece of pleura and lung removed.	.....	.....	.....	.....	Recovery. Piece of lung also removed.

No.	Operator; year.	Bibliographic reference.	Sex and age.	Cause and duration.	Size and situation.	Rapidity of growth.	Histological classification.
41	Sheild, 1894	London Lancet, 1894, p. 741.	M. 10	12 to 15 mos.	Size of orange; right side.	Slow.	Sarcoma.
42	Faure, 1895	Revue de Chir., May 10, 1898, p. 402.	M. 61	Fract. rib, 18 months.	12 cm. diameter; right side.	Slow.	Sarcoma.
43	Karewski, 1895	Deutsche med. Woch., 1896, No. 14.	M. 36	.....	3 walnut-sized in the axillary line of the right side.	.....	Sarcoma.
44	Quenu, 1895	Revue de Chir., May 10, 1898, xv. p. 396.	M. 49	10 years.	Left side from 5th to 9th ribs.	Slow, then rapid.	Chondroma.
45	Dennis, 1896	Park's Surg., by Amer. Authors, 1896, vol. ii.	M. 15	3 months.	Right axillary aspect of chest.	Rapid.	Sarcoma.
46	Bayer, 1896	Centralblatt für Chir., No. 2, 1897.	M. 13	.....	Size child's head, right thoracic wall.	.....	Sarcoma.
47	Thompson, 1896	Texas Medical Journ., 1896–97, vol. xii. p. 415.	F. 45	18 months.	Size of fist; left side below and to right of nipple	Slow, then rapid.	Sarcoma.
48	Doyen, 1897	Revue de Chir., May 10, 1898, p. 399.	F. child.	.....	.....	.....	Sarcoma.
49	Helferich, 1897	Gerulanos in Deut. Zeitschrift für Chir., Oct. 1898, p. 498.	M. 15	Blow, 1 yr.	Size child's head; right side.	Slow.	Sarcoma.
50	Parham, 1897	Present paper.	F. 27	7 months.	Right side, region of mamma.	.....	Sarcoma.
51	Gauthier, 1898	Revue Internat. de Med. et de Chir., 9th year, Oct. 25, 1893, No. 20.	M. 27	4 months.	Orange size; left side posteriorly, level of 9th rib.	.....	Sarcoma.
52	Parham, 1898	Present paper.	M. 28	6 years. Injury from brace.	Upper half of left side from clavicle to 6th rib.	Slow, then rapid.	Chondrosarcoma hyaline cartilage.

Operation, anæsthetic, duration.	Size of pleural opening.	Phenomena on opening.	Management of.	Drainage and suture.	Remarks.
Separation of scapula from thorax, unsuccessful attempt to peel tum. from pleura; accidental opening of cavity, and operation abandoned. A. C. E mixture.	.....	Moderate	.....	.....	Death. Operation incompleted.
Extirpation par morcellement. Chloroform.	2 cm.	....	Tamponed with iodoform gauze and sutured.	.....	Recovery. Recurrence.
6th, 7th, and 8th ribs and piece of pleura resectd.	.....	Great paleness and pulse imperceptible.	.....	.....	Recovery. Two operations.
4th, 5th, and 6th ribs resected.	Two wounds	Cyanosis, apnœa, asphyxia, and fall of pulse.	Operation uncomplet'd; artificial respiration.	....	Collapse; death.
One rib and portion of pleura resected.	.....	....	....	.....	Recovery. One operation.
Pleura torn, tamponed and operation completed three days later.	Large.	Collapse.	Lung brought up and fastened to edge of wound.	Opening left for drainage.	Recovery. Operation in two stages.
3d, 4th, and 5th, and cartilage of 6th rib and pleura resected; chloroform 1½ hours.	3 inches	Lung slowly collapsed	.....	Flap sutured. iodoform gauze plug.	Gradual recovery. Recurrence five months later. Two operations
Thorax and adjacent pleura resected	....	Lung collapsed, suffocation.	Wound closed with flap.	.....	Recovery.
3d, 4th, 5th, 6th, 7th, 8th, and 9th ribs resected; chloroform 1½ h	Immense.	General collapse.	Gauze packing.	....	Death. Resection of portion of lung.
3d, 4th, and 5th resected 5 inches, chloroform 2 h.	5 inches in length.	Lung collapsed, pulse almost imperceptible.	Strychnine and digitalis hypodermatically; artificial resp.; pectoral muscle sutured over pleural rent; saline transfusion.	Gauze drainage.	Recovery. Pneumonia one year after recovery. No recurrence after twelve months.
Hand-sized portion of costal pleura resected; chloroform.	....	Breathing bad, chloroform stopped, injection of ether and caffein.	After operation injected with 1 quart artificial serum.	Sutured, with gauze pack.	Recovery. Recurrence six months after.
2d, 3d, 4th and 5th ribs resected; chloroform 1½ h.	Size of palm of hand.	Lung collapsed, pulse almost disappeared; profound shock, but quickly disappeared under forced respiration by Fell-O'Dwyer apparatus	Lung sutured to margin of opening.	Closed without drainage; suppuration; incision.	Letter five mos. later; perfectly well. Letter May, 1899, continues well.

APPENDIX.

Gaston writes as follows in Sajous' *Annual*, 1890, Band xix.:

N. Senn, in a letter received by him December 27, 1889, reports a case of osteosarcoma of the ribs operated on by him.

He states that a man, aged about sixty-five years, noticed four months previously a small swelling on the right lower part of the chest. The growth had reached the size of a hen's egg four weeks after. It was located near the cartilage of the tenth rib, was diagnosticated as osteosarcoma, and, resection being advised, the patient entered the Milwaukee Hospital for that purpose. Ether was used for anæsthesia. On cutting down on the tumor the incisions were extended so as to remove the germ of infiltration. The rib on the vertebral side of the tumor was denuded of periosteum and divided with bone forceps about one inch (2.5 cm.) from the margins of the growth. In attempting to remove the mass with blunt instruments the pleural cavity was opened, and air rushed in, causing collapse of the lung. The tumor, with a portion of pleura, was excised, cutting through the costal cartilage with the same scissors, thus exposing the collapsed lung to view. An antiseptic compress occluded the wound while the sutures were introduced and tied. Antiseptic dressing, without drainage. The patient being threatened with collapse, the anæsthetic was suspended and stimulants administered, with a favorable result. The wound healed by primary union. The day after the operation the lung had partially expanded, and on the third day no signs of pneumothorax could be detected. The tumor, on microscopical examination, was found to be a round-celled sarcoma,

intimately adherent to the costal pleura. Prior to operation adhesions should be secured by stitching the pleural surface around the tumor.

G. G. Hamilton reports, in the *Liverpool Medico-Chirurgical Journal*, July, 1892, the case of a lad, aged eighteen years, who had noticed for some time on the right side a growth about the size of a walnut, which had lately grown to the size of a turkey's egg. The growth and the eleventh rib were removed, necessitating the opening of the pleural cavity. A portion of the diaphragm had to be removed, making an opening into the peritoneal cavity. The peritoneum was stitched, the gap in the diaphragm closed, and a large drainage-tube placed in the pleural cavity, the outside wound being brought together with sutures. The wound healed by first intention, and at the end of a fortnight the lung had expanded and the lad had gone to work.

According to Sajou's *Annual*, 1889, "Special Excisions," "Cerné successfully removed the eighth rib, with the associated costal pleura, for osteosarcoma, the patient being a child." I have not been able to verify the reference, which is given as *La Normandie Médicale*, August 1, 1888.

A case is attributed also to Schnitzler, of Vienna (*Medical Press and Circular*, London, March 14, 1894; Sajous' *Annual*, 1895, Band xxviii.); but I have been unable to find this case, and the notes in the *Annual* are too inadequate for quotation.

Quénu and Longuet in their list credit two cases of fibroma of the ribs to Demarquay, stating simply that the cases were both women, and that the neighboring rib in each case was "ablated," but they give no bibliographical reference. The source of their information must have been the *Inaug. Dissertation* of Hermann Plitt, Berlin, 1890, where he says, in

referring to the rarity of costal fibroma: "Demarquay saw two cases in women. These were seated in the precardial region, starting apparently from the periosteum and being connected with the pleura. Nevertheless, extirpation was done without injuring the pleura." But no details are given.

A thorough search of the Library of the Surgeon-General's office in Washington fails to disclose any case of resection of a rib for tumor to be attributed to Demarquay. All the references in the library to Demarquay are of tumors of the breast proper; in none of them was the bony wall operated on. In the *Bull. Soc. Anat. de Par.*, 1844, xviii. 331, two cases of Demarquay are related of fibro-cystic tumor of the breast in women, aged, respectively, forty-six and forty-five or fifty years, but in neither case was the bony wall of the chest disturbed. These I suspect of being the same cases as those in Quénu and Longuet's list. I have, therefore, rejected them from my list.

The following case also occurs in Quénu and Longuet's table, but a reading of it shows that there was no costal resection.

Case of Morell-Lavallee, 1861, enchondroma of the mammary region (*Bull. Soc. de Chir. de Paris*, 1862, 2 S., iii., 498-501). Enchondrome de la region mammaire, simulant une énorme tumeur du sein chez l'homme. Operation; guérison.

Male, aged thirty-five years, day laborer. No hereditary antecedents; no previous disease. Since birth the left breast had been larger than the right. Further back than he can remember the left breast had always been as large as a fist. It was about this size until about two and a half months ago, without ever having been the seat of any pain. At this time it began to grow quite rapidly, and to-day has the volume of the head of a child of four years. It has the form of a well-developed woman's breast, firm, except a prominence breaks its regularity at the antero-superior part.

He was operated on and recovered. This case is found as No. 10 in the list of Schläpfer von Speicher, who gives exactly the same bibliographical reference (*Gaz. des Hôp.*, Paris, 1861, 105) as that credited by Quénu and Longuet. This account, too, corresponds with that given in the reference quoted at the head of this abstract, and is without doubt the same. In both references it is distinctly stated that the tumor was one of the soft parts. The article in the *Gaz. des Hôp.* gives it as a congenital tumor, cartilaginous, with colloidal change, situated under the pectoralis major and adherent to both pectorals; origin not quite distinct. In neither reference is it stated that any rib was resected. We believe, therefore, that Quénu and Longuet have wrongly included this case in their list, and so we have excluded it from our tables.

DISCUSSION.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—This paper will revolutionize my plan of treatment in reference to surgery of the ribs. There is no question but that Dr. Parham has opened up a field which will materially change the literature of thoracotomy in regard to operations upon the ribs. From a pathological stand-point, it has not been my experience that sarcoma of the ribs follows a typical course. In operating for sarcoma in bone, unless the surgeon resects the whole bone, the operation does no good, so far as the ultimate results are concerned. I have declined to operate on such cases as the doctor has operated on. I have gotten fairly good results in some cases from simple resection of the ribs.

Another point brought out by the doctor of equal importance is the control of atmospheric influences while operating on the thoracic cavity. His results show that we can expect more from artificial respiration than we have heretofore. I have found in the majority of cases where there was no doubt about rapidly growing sarcoma on other bones, that there was no use in operating unless the patient was seen early and complete removal of the whole bone was undertaken, because extension along the medullary canal was so rapid that instead of the disease following one type, it was spindle-celled, or small, round-celled sarcoma. In making a superficial examination of the specimen that has been passed around, I do not know from what portion of the ribs the tumor was taken, but there seems to be nothing strictly indicative of the mixed variety in the whole case. As a rule, I do not think that is true of sarcoma of bone. My observations of sarcomata of bone have been that they are apt to be either of the mixed variety, or very early become so. They do not follow a typical type at all. If that is true, we can readily understand why Dr. Parham has had good results. Many of you, doubtless, know that the rib in nervous cases or in cases of insanity undergoes changes that no other bone does. It seems to me very peculiar as far as that is concerned, but that is my personal observation, and we have checked up cases from three hospitals for years. I have never found typical bone sarcomata following

any particular type that had existed for any length of time. They had always been of the mixed variety. The moment the cells become typical or embryonic the disease will take on a malignancy equal to carcinoma.

The doctor's paper and specimens will change my procedure in future cases.

Dr. William Simpson Elkin, of Atlanta, Ga.—I have been very much interested in Dr. Parham's paper, although I have had no personal experience in dealing surgically with sarcoma of the ribs. There was one point I was particularly interested in, namely, the pneumothorax, produced by the air entering into the pleural cavity and causing such a serious effect. Recently I operated on a case of empyema, making Estlander's operation. I removed about thirty-six inches of the ribs, from the second to the ninth inclusive. No serious trouble, whatever, was experienced in the course of the operation, until I removed the thickened pleura and intercostal muscles, when the patient came very near dying on the table. The already contracted and compressed lung became suddenly collapsed, and for a few minutes I thought my patient would die. I did not use the method of artificial respiration suggested by the essayist, but I am satisfied if I had had the apparatus at hand I would have done so and relieved myself of much anxiety. After closing the skin-flap over the abscess, and resorting to the hypodermatic use of strychnine and a normal salt solution by the rectum, the condition of my patient began to improve. For two or three days after the operation the respiration was from 40 to 60 per minute, and the pulse from 120 to 160. As soon as my patient became sufficiently conscious (about the fourth or fifth day) I had him exercise the lung by blowing through a rubber tube attached to a series of bottles. In this way the lung was gradually expanded, and the respiration soon became normal.

Dr. Louis McLane Tiffany, of Baltimore, Md.—The most excellent paper of Dr. Parham has suggested one or two points which I would like to have him answer or elaborate in his closing remarks. He spoke of removing the intercostal muscles, etc. It would be interesting to know whether in the area from which the intercostal tissues were removed the lymphatics and blood-vessels are still alive. As a rule, sarcoma generalizes itself by the veins, but sometimes it does not. In sarcoma of the lung

bones it is customary to take away all of the diseased portion of the bone, then there is not likely to be a recurrence.

Another point is with reference to the entrance of air into the pleural cavity. I have had decided views on this subject for some time. I am not familiar with the apparatus for artificial respiration used by Dr. Parham, but undoubtedly it is an admirable thing.

As to collapse of the lung in operations upon the chest, we have noticed a material difference between operations upon a diseased chest and a healthy one. The history which Dr. Parham gave has been repeated again and again in operations on the healthy pleura. When a patient collapses there is usually a great deal of trouble. In pleurisy the chest cavity gradually fills and the pleurisy changes to empyema, and the fluid is aspirated under anæsthesia. You are all familiar with the large trap-door operations done upon the chest, and the patient does not change respiratory action during the administration of the anæsthetic. We may do whatever we like upon a pyothorax, and there is no trouble with respiration. It is very different where the pleura is intact. This is one of the operations which should be done in two stages. Antiseptic air should be introduced into the chest for a day or two before operation, and the lung made to collapse and remain so. Dr. Murphy has been doing the same thing with nitrogen gas, and his paper has been published in the *Journal of the American Medical Association*. We know bilateral organs are luxuries; a person can get along with one ear, one leg, one ovary, and so a patient can live with one lung. I believe we can lay one-half of the chest wide open and see inside, as one looks inside the abdominal cavity, and it can be done perfectly well. In other words, produce collapse of the lung, fill the pleura with filtered air, and continue to do so. Teach the lung on that side to collapse and remain so, and then at the time of the operation it will be like an empyema.

Dr. Westmoreland.—In how many cases have you tried this method of collapsing the lung?

Dr. Tiffany.—I have not tried it at all. The experiments of Murphy last year show that this can be done, and the future possibilities are great in this field of surgery.

Dr. William E. Parker, of New Orleans, La.—I had the pleasure of witnessing the first of these operations by Dr. Par-

ham. He was operating on the case at the Charity Hospital, when I happened to drop in, and I can bear testimony as to the condition of the patient. I thought he was going to die on the table. I have also had the pleasure of examining the doctor's last case, and the magnitude of the operation would be impressed upon you more deeply could you have had an opportunity of seeing the patient. I believe surgery of the chest is in its infancy, and that in the next five years great advances will be made along this line. I believe the use of the Fell-O'Dwyer apparatus will do a great deal toward advancing this line of surgery. I believe the doctor's case was the first one in which this apparatus has been used for this work.

Dr. Parham (closing the discussion).—Dr. Westmoreland has alluded to the mixed character of sarcomatous tumors. I found in looking over the literature of the subject and studying up the cases more thoroughly, that many of them were mixed, as chondrosarcoma, spindle-cell and round-cell sarcoma. I take this opportunity to call attention to the fact that so far as the operative diagnosis of these tumors is concerned, it is not so easy to determine what the character of the tumor is. Enchondroma is usually considered a benign tumor; it grows slowly, lasting for many years. Very strangely, many cases, as I found in looking up the literature, showed secondary growths or metastases, exhibiting many of the clinical features of malignant tumors, so that I believe enchondroma should be treated surgically as if it were a malignant tumor. Dr. Senn, in his book on tumors, says that an enchondroma very frequently takes on malignancy after operative interference not radical in character. They, therefore, should be operated on early and thoroughly. The great trouble with this whole class of tumors is this: They grow slowly, and patients do not consult us until it is too late to make a radical cure in many cases.

One of the gentlemen (Dr. Elkin) spoke of Estlander's operation; and Dr. Tiffany referred to the difference between a healthy pleura and one subjected a long time to suppuration. I agree with him that there is a great difference in this respect. Opening the normal pleura is quite a different matter from opening a pleura which has been bound down by adhesions to the lung, where the operation is much simpler.

With reference to removing the lymphatic tissue, a point referred to by Dr. Tiffany, I found that this was not done in more than a few cases. In some cases the lymphatic glands in the axilla, although not involved at the time of the operation, were subsequently removed. In one case even the supra-clavicular glands were implicated. A third operation seemed to have resulted in a cure, so far as I could learn subsequently, as there was no recurrence. In most cases the lymphatic glands are not involved. I found the statement made that in most cases the lymphatic glands were not involved and the tumor was strictly limited at its base. There was no evidence of infiltration; there were secondary tumors in but few of the cases that I could find.

With reference to taking away the whole bone, as is done in other parts of the body, it would, of course, be impracticable to do the operation if that must be done. Statistics show that by going wide of the tumor, especially in the enchrondromatous variety of tumor, a radical cure may be effected without removing the bone back to the vertebral column.

As to the Fell-O'Dwyer apparatus, my attention was again drawn to it by Dr. Matas in a paper read by him at the meeting last year of our State Medical Society, and I determined to use it if I had another case, and this case afforded the opportunity.

As to the introduction of air into the pleural cavity, which Dr. Tiffany spoke of, I have read with pleasure the paper of Dr. Murphy. It is an extremely valuable contribution to surgery in this department. The idea, of course, is not original with Murphy. Sterile air, oxygen, and even nitrogen were used before Dr. Murphy used them, and in a recent editorial in the *Medical News*, it is said that the whole apparatus for making nitrogen and introducing it into the chest cavity was invented and described long before the publication of Dr. Murphy's article. Whatever the results shall be in the treatment of tuberculosis by the injection of nitrogen into the pleural cavity, time alone will show; but so far as its usefulness is concerned as a preliminary procedure for operations upon the chest, I do not believe that it will be shown to be of much value. What we want is to get an apparatus which will prevent collapse of the lung until we can suture it to the wound. Tuffier, Quénu, and others have made

valuable experiments in this respect. Tuffier has attempted to introduce a tube through the trachea or glottis above to keep the lung distended, while Quénu has attempted by a special device to hold the lung up in animals until it can be sutured. The procedure of Witzel deserves consideration, namely, filling the pleural cavity with aseptic fluid, or a boric-acid solution, and drawing it out before the last stitch is put in.

A CASE OF VESICO-RECTAL FISTULA OF SEVEN YEARS' STANDING—PRELIMINARY ILIAC COLOSTOMY—FISTULA CLOSED AT THE FIFTH OPERATION.

By George S. Brown, M.D.,
Birmingham, Ala.

This boy, G. G., white, aged thirteen years, came to me for treatment in January, 1898, with this history:

In March, 1891, at the age of six years, he was cut for stone through the perineum, after which he was found to have a fistula between the bladder and rectum, from which the urine constantly dribbled away. In November, 1891, eight months afterward, another surgeon operated to close the fistula, but without success. At intervals during the following year (1892) the same surgeon made two other attempts to close it, but all proved failures. From the latter part of the year 1892 until January, 1898, no effort was made to relieve his very unfortunate condition. When he was brought to me at this time (January, 1898) his general health was beginning to suffer. He had been going to school, but could not take a great deal of exercise. Had frequent colds and attacks of bronchitis. His parents were compelled to live near the school, so that he could run home every hour or two and have his napkins changed. In spite of remarkably diligent efforts on their part to keep him clean he was a good deal of an offence to himself, his teacher, and fellow-pupils. Upon examination I found the buttocks in the anal region badly excoriated and the seat of numerous pimples and boils. The anus was slightly gaping at its anterior part,

the perineum having been in a large part destroyed, so that there seemed to be very slight depth of tissue between the urethra and anus, or this scar-tissue, which lined the anterior circumference of the anus to a depth up the bowel of an inch or more.

Upon dilating the anus slightly and with reflected light, the fistula, as large as a small finger-nail and circular in shape, could be easily seen, situated slightly above the internal orifice of the urethra. The prostate gland could not be made out, except that the bladder and urethra were slightly thickened at this point. After five days' preparation of emptying the bowel and giving astringents, coupled with starvation, with a view of preventing the bowel from moving and infecting the stitches with fecal matter, he was etherized and the fistula pared and closed with fine silver sutures put in transversely and about one-eighth of an inch apart. A small elastic catheter was left in the bladder forty-eight hours. The catheter caused a great deal of urethral irritation, and became so encrusted with lime-salts as to be difficult of removal. In spite of our precautions, there was a fecal passage on the second day, and, on account of this, probably, the wound entirely broke down on the third day. Five days after this the stitches were removed, encrusted with lime-salts, and he was sent home.

He was admitted again on April 21, 1898 (three months later), at which time the fistula was found to be still about one-half inch in diameter. There had been up to this time in all four attempts to close this opening, and it seemed to me useless to try further as long as the same certainty of infection by the fecal matter remained.

I had been unable to find any mention of such a condition in any of the text-books, and was somewhat at a loss whether or not I would be justified in making a temporary colostomy.

About this time I heard that this condition (or rather a recto-urethral fistula) had been successfully treated in this way by Dr. J. P. Tuttle, of New York. I decided to do

this, and also to make an epicystic opening to drain away the very septic urine.

These operations were done on April 30th at one sitting as a preliminary measure. A loop of the sigmoid was taken up through an incision in the left iliac region, and a silkworm-gut mattress suture was passed beneath it through the skin, mesentery and skin, and back again. When firmly tied this drew the skin on either side close against the mesentery and served the purpose of the glass spool or strip of gauze commonly used. This suture supported the loop as well as prevented the possibility of a strain on the tight stitches with which the bowel was next closely fastened all around to the peritoneum and fascia. The bowel was immediately opened longitudinally with a knife for a distance of nearly two inches; no bleeding followed to speak of. The bladder was then opened in the following rather novel manner: A thin rubber bag, devised by Dr. J. G. Clark for making applications to the mucous membrane in the female bladder, was inserted into this bladder through the fistulous opening in the rectum. This bag, being distended with air, made this operation of epicystostomy probably the easiest one ever performed. Having the bag distended, the bladder, when cut into, did not collapse, of course, as it would have done had it itself been filled with air or water. The bladder wall, after being cut through to the extent of three-quarters of an inch, was stitched with all possible care to the skin on either side of the wound. Following this etherization the patient had ether pneumonia, which I shall speak of again later.

Ten days later, on May 9th, the fistula was again attacked. The bowel and bladder having been thoroughly irrigated daily since they were opened, and having performed their functions without any trouble at all, the edges of the opening were again freshened as before, the rectum being first dissected away above and to either side in a crescent-shaped flap. The wound was closed transversely with silk and the rectal mucous membrane brought down and sewed over this. The wound again broke down completely about the sixth day, the

sutures in the rectal portion giving way entirely. The stitches were removed ten days after the operation, when the fistula was found to be very much smaller. On May 25th the fistula was found to be still smaller and was again closed in the same way as before, except that I used silkworm-gut, a catheter being introduced through the urethra and the bladder kept constantly washed, the water returning through the fistula and keeping the field clear of blood. At the end of six days the fistula was again leaking, and the stitches were again removed and the boy was sent home. The epicystic fistula had closed, but the fecal opening was left until further attempts had been made to cure the opening in the bladder below.

He was admitted again on September 9th, and on September 12th he was again etherized, and the fistula was found so small as to admit a pin-head-sized probe with difficulty. This time, after paring out the fistula (I think, perhaps, I should have tried touching it with the cautery this time), I introduced the stitches vertically with the body instead of transversely, as I had done each time before. This was bad judgment. I ought to have been satisfied with finding the fistula smaller after each operation. Had I been so, and introduced the sutures this time as I had before, transversely, I feel sure it would have been cured. I think, undoubtedly, this drawing down the base of the bladder and closing the fistula with it caused the wound to tend to pull open each time the bladder contracted. This was borne out, I think, by the fact that when the wound broke down it left the opening almost as large as when I first operated upon it.

On October 31st I operated again, and this time made a success of it. I made a rather more extensive dissection of the rectal wall from the bladder above, and cut through the scar-tissue below in the urethra for about one-half inch. This left the fistula something over an inch long, about two-thirds of it being in the bladder and the other third in the urethra. It was closed with silk, the ends of which were left one inch long. The rectal wall was closed over this, except at the lowest angle, where the inch-long inner stitches

were drawn through for drainage. Following this operation both the bladder and bowel united at every point.

Seventeen days later (November 17th) I operated to close the artificial anus. The bowel was dissected from the skin and surrounding scar-tissue down to the peritoneum, but not through it at any point. The spur, which seemed to be about three-quarters of an inch deep, was cut through with the scissors after being ligated step by step on either side, after the manner of tying off the broad ligament. The bowel was then sutured transversely (it will be remembered it was opened longitudinally), the prolapsed mucous membrane being turned into the bowel by taking Lembert sutures through the muscular and submucous layers. The serosa had disappeared from this exposed bowel down to the peritoneal adhesions. The skin was then brought over and united with a continuous buried silk suture, a twist of catgut being left at the upper angle for drainage. This wound seemed at first to have closed primarily, as he had daily movement from the bowel without any sign of leakage for five days; it then leaked through a small opening, which still exists. There were several points of interest in this case, taking it all through, which may warrant my imposing further upon your time to summarize.

1. The astonishingly small amount of information one can gain from the text-books on this subject, when it would seem that it must have been a very common accident in the days when the perineal operation for stone was so fashionable. E. L. Keyes, in Ashhurst's *Encyclopædia*, says that it was not an uncommon accident; that Thompson confessed to four such in his own hands, so there must have been others. He says that wounding the rectum has at times resulted in a permanent recto-urethral fistula, which is very difficult to cure.

I have heard that Dr. J. P. Tuttle, of New York, has recently published in the *Medical Monthly*, of Louisville, a paper on "Twenty-five Collected Cases of Recto-urethral Fistula," including two of his own. In one of his he made an iliac opening in the bowel as a preliminary.

Keen and White's text-book mentions as one of the dangers of the perineal operation for stone, a permanent recto-urethral fistula, but I have been unable (after a limited search, it is true) to find any mention of a vesico-rectal fistula.

The second point of interest in my efforts with this patient was the necessity of diverting the fecal current by means of the artifical fistula. I doubt very much if the repair could ever have been done without it.

The final result proved that it was unnecessary to open the bladder above, because that opening closed after one operation which failed, and, of course, was not open when union of the fistula was finally obtained.

There was no great difficulty in getting at the fistula nor much manipulative skill required in sewing it up. Having the patient in the Sims position, with hips elevated and a flat retractor against the posterior wall of the rectum, then, by putting a heavy silk ligature deeply through the scar-tissue, just at the lower edge of the fistula, the field of operation was drawn down half an inch and the operation itself made comparatively easy. Such operations, of course, were next to impossible before suitable instruments had been devised to meet the conditions.

The patient has been anæsthetized sixteen times. I myself have etherized him seven times for operation, besides giving him chloroform three times to remove stitches following the failures. He has established a tolerance for ether that is very interesting. He takes very little in going under, and after two hours wakes up with hardly a sign of being intoxicated even, and with no nausea at all. After the preliminary operations upon the bladder and bowel in May (it having lasted over two hours) he had ether pneumonia, which lasted four days and then cleared up rapidly. Dr. Kelly speaks of ether pneumonia as having happened eight times in about two thousand etherizations in his practice. It is caused by an excess of bronchial mucus which gets infected and fills the small tubes and possibly the air-cells.

I think the success of the last undertaking was somewhat owing to the fact that we were able to control him about voiding his urine, each time the effort was made to prevent his voiding it voluntarily, by having him catheterized every three hours; but this was not accomplished until after the last operation. He probably more fully realized the importance of it himself, and the bladder and urethra were much more tolerant than when he came in first. At any rate, he was catheterized every three hours, and the bladder washed out once a day for ten days.

In this condition of vesico-urethral fistula the urine is always in contact with the vesical side of the wound, even when in the smallest amount, and exerts a pressure upon the line of sutures as well as infecting them with the sediment in the bladder. Of course, such a fistula as this is more unfavorable than an opening into the urethra, which, with the aid of a catheter, can be kept entirely free from contact with the urine. I think, however, the principle reason for the last operation being successful was that it was cleaner, no fecal matter having passed that way for six months. The colon bacillus, that inevitable pus-producer, was absent.

DISCUSSION.

Dr. William E. Parker, of New Orleans, La.—I was very much interested in Dr. Brown's paper, for the reason that I had a case somewhat similar in many respects and due to the same cause. This man had a fistula from the prostatic urethra into the rectum. He also had a fecal fistula in the left inguinal region. The patient was operated upon two or three times by a prominent member of this Association, and finally the case drifted into the hands of Dr. John D. S. Davis. The man was poor and could not pay for the hospital care he needed, and Dr. Davis sent him to the Charity Hospital to me. At the time I saw him there was a drainage-tube going through the left inguinal region, and coming down through the fistula. The young man was run down very markedly, and was taking ten grains of morphine a day. This condition had been going on for about three years as the

result of stone in the bladder. We tried to wash out the bladder and rectum. I enlarged the opening, then made a perineal section, and dissected up the scar-tissue between the urethra and bladder. I tried to close the fistula through the rectum, and at the same time leave an opening. The man did fairly well for a time, but the result from this fecal fistula was not good, and the rectal wound did not unite. I had Dr. Parham see the case with me. We talked it over, and decided that the proper thing to do was to lay this open freely, so that we could pack the bottom of the cavity and heal the fecal fistula first. We did this, succeeded in closing the fecal fistula, and after that we managed to break him of the morphine habit, when his general condition had very much improved. He was in the hospital for quite a time, and gained forty pounds while there. The last operation that we did on him was to dissect the scar-tissue up thoroughly with the bladder, thoroughly wash out the bladder and rectum, and the bowel had been cleansed thoroughly with salines. He had been placed on a liquid diet for several days. We operated again, using silkworm-gut sutures, and at the time I left New Orleans, in April last year, the fistula was almost closed. There was still a small opening, but he could hold his urine for three hours at a time, at the end of which there was a little dribbling. This patient having been operated on a number of times before coming under my care, there was a great deal of scar-tissue, and the urine in dribbling down through the rectum had made the parts raw. The patient left the hospital while I was away, and I do not know the final result.

Dr. Brown's case interested me, and while my case was also an interesting one it was very troublesome. It was no easy matter to break him of the morphine habit. He not only annoyed us a great deal, but the patients in his ward, for quite a long time.

Dr. Howard A. Kelly, of Baltimore, Md.—I have been deeply interested in Dr. Brown's paper. I think he is to be congratulated on his faithful persistence in the treatment of this case. The case reminds me very much of Marion Sims' early operations for fistula. You will remember that he operated as many as thirty times, and finally his efforts were crowned with success.

I would like to say a few words on the general principles of treatment of fistulous openings from the hollow viscus into the surface or into the adjacent viscus; in other words, fistula from

the bladder into the bowel, from the bladder into the vagina, or from the rectum into the vagina. In considering such a subject as this we can best illustrate our work by such drawings as these (illustrating). I take it that the principles will be about the same in the female as in the male, and so I will speak of those conditions with which I am most familiar.

Before beginning active treatment of the fistula we want, if possible, to get rid of the active inflammation of the viscus except immediately around the fistulous area. Fortunately, where the bladder is connected with the genital tract in women, drainage itself will relieve any inflammatory conditions which have existed. As a rule, we do not have much cystitis where the bladder is connected with the rectum in the female, which is rarely the case. It is not necessary to get rid of the focus of inflammation in a male around the bladder, as in the method I am about to speak of a small area of inflammation may be readily exsected. A satisfactory plan of treatment is this: The rectum and the bladder may be dissected loose from the viscus to which they are attached or from the vagina. We may dissect it loose for a considerable area around the fistula, and after setting it free, instead of a rigid fistulous tract (with marked scar-tissue, as on the surface of the skin or on the vaginal surface), we have then to deal with the lax structures of the rectum or of the bladder, and it is easy to unite the parts in this manner (illustrating) with catgut sutures, turning the tissues up toward the surface from which you want to prevent the flow, putting in two layers of sutures, one buried, and one below it. This is applicable in cases of vesico-vaginal fistula in which the whole base of the bladder is gone, in which there is a considerable amount of scar-tissue in the vault of the vagina. Where you cannot bring the tissues together you can easily dissect loose the bladder, bring it together, make a new bladder, putting no tension on the vagina, draw the bladder together, get union, and cure the case. I have done this operation in cases that were intractable by any of our previous classical methods in vogue. I have done a similar operation in cases of recto-vaginal fistula, splitting the vagina through the fistula. In other instances I have cut across the vagina in this manner (illustrating), then sewed up the wound, and have gotten a successful result. In other cases I have split the perineum and sewed it up so as to get a

good result. On the rectal side I would divulse the sphincter beforehand, taking care not to let the feces crowd down on the wound, particularly in the sphincter area.

One matter before I close. The doctor speaks of injury to the sphincter of the bladder. This is a serious matter in women or in those cases where the neck of the bladder has been badly damaged in confinement, and the sphincter either crushed or torn through. Some of the older anatomists deny any sphincter of the bladder. Bell, in the early part of the century, showed an aggregation of circular muscular fibres; this has been demonstrated since, and is evident to anyone who will make a dissection of the bladder.

I remember having a case of incontinence of urine from injury to the sphincter of the bladder, in a woman who had been operated upon by a variety of methods. I performed the following operation with almost immediate and perfect success: In the first place, in putting a catheter into the bladder and pushing it forward the tissue was thinner than elsewhere; the septum was not as thick. I cut down on the catheter at the neck of the bladder, severed the vagina from the bladder, pulled the vagina widely apart, and went up laterally to the neck of the bladder. After this I made an incision in the cervix uteri. This diagram will represent the urethra, and this (illustrating) the incision that was made in the anterior wall. Then I exposed the bladder in this way (illustrating). Here is the urethra, and here the bladder. After pulling aside the vagina there seemed nothing but mucous membrane near the point of the catheter. I went high up laterally, and very distinctly demonstrated a group of muscular fibres drawn together in a manner quite different from the muscularis of the bladder. I caught these fibres on either side, brought them down by a series of catgut sutures, united them, closed the vagina by a series of interrupted sutures, and the woman had perfect control. It was one of the most satisfactory things I have ever done in connection with my gynecological work.

Dr. Stone.—I would like to ask Dr. Kelly to describe to us his method of making a new urethra where the urethra has been destroyed. Dr. Bovée and myself have each had one case.

Dr. Kelly.—I have had no experience in that regard, and I do not know what I would do in such a case.

Dr. W. E. B. Davis, of Birmingham, Ala.—In the case of

Dr. Brown, it occurs to me that the suprapubic operation might have rendered him some assistance if he had done it at the time he restored the bladder. It would have saved the patient from using the catheter. In a boy fourteen years of age that is often a troublesome feature in the after-treatment of the case.

With reference to the case referred to by Dr. Parker, the patient was sent to our private hospital in a very extreme condition. The young man had been operated on for stone in the bladder, and the fistula resulting from the operation had been operated on a number of times by an excellent surgeon. When he came to us an abscess could be felt very easily through the abdominal wall. An incision was made anteriorly and thorough drainage effected. As the boy was poor we succeeded in getting him admitted to the Charity Hospital in New Orleans, and I am gratified to know from Dr. Parker that he got a good result in this case. We made no attempt to repair the injury.

Dr. Brown (closing the discussion).—My main object in reading the paper was to elicit some information on the subject and to hear reports of similar cases. I have profited a good deal by the talk of Dr. Kelly. I forgot to mention one thing, namely, the last time I visited the patient he had incontinence of urine. After the bladder contained two or three ounces of urine there was a leakage from the urethra, not from the fistula. I attributed this to the destruction of the sphincter in the region of the prostatic urethra.

Another point I intended to bring out was this: that in this boy, in all probability, the opening of the seminal vesicles had been destroyed. The whole region was a mass of scar-tissue, as so many operations had been performed on him. One surgeon cut his rectal sphincter, so that when the stools are liquid he has no control over them. Ordinarily, he is able to control his bowels very well, but if he takes a dose of salts there is incontinence.

FOREIGN BODIES IN THE ŒSOPHAGUS, WITH REPORT OF CASES.

By Albert Vander Veer, M.D.,
Albany, N. Y.

Of the conditions called emergencies in the practice of surgery there are few that require such prompt action on the part of the physician as the treatment of cases of foreign bodies either in the air-passages or œsophagus. No period in life escapes. The infant, playing with some toy, inhales or swallows it, and the life of many a little one has been saved by the energetic action of the mother or grandmother, whose finger, being introduced at the critical moment, grants prompt relief. The young child who has some toy, generally in the form of a musical instrument, is subjected to these dangers, and perhaps one of the most serious has been the toy balloon, which the little one sucks back and forth in its mouth until it becomes distended, is suddenly drawn back into the pharynx, and causes immediate suffocation. Adults, eating in a great hurry, will take into the œsophagus such large substances as portions of meat and other articles of food, causing a pressure upon the trachæa that will result in death from suffocation.

These cases are of the class that the young physician, as well as the one in advanced life, may be called to attend at a moment's notice to render assistance.

The following cases I desire to place on record as illustrating some of the points in this kind of surgery:

Case I.—In August, 1869, Mr. J. F., aged twenty-four years, retired at his usual hour of bedtime, and on awakening

suddenly in the night from a horrid dream was distressed in missing his plate with two teeth attached. I was called to see him the next morning by his family physician, and from the ease with which he could swallow, and as passing an ordinary bristle probang at the time gave no result, I concluded he must be mistaken or they had passed into the stomach. I did not see him again. I was told afterward he had no untoward symptoms for a period of nearly ten years, when he began to show signs of stricture of the œsophagus, from which he suffered more or less for two years, when Dr. McLean, of Troy (the patient then residing there), did an œsophagotomy, removing the teeth, which were located in the lower part of the œsophagus, and had remained there undoubtedly during the entire time.

Case II.—In November, 1870, M. A., colored, aged three years, was brought to my office in haste with the following history: While playing with the cover of a teakettle she loosened the top (Fig. 1), put it into her mouth, and it dropped back into the pharynx, causing immediate symptoms of suffocation. A stout-hearted Irishman picked the child up, took her to a neighboring physician, within two or three doors and within four blocks of my office. The doctor said he could do nothing for the child, but ordered her taken to me at once. She was nearly suffocated. As I introduced my finger far down into the pharynx I could just touch the foreign substance, and with curved forceps succeeded in removing it at once. Slight effort at artificial respiration restored the child; she then began to cry vigorously, and recovered without any untoward symptom. The two or three friends of the patient, together with the noble-hearted son of Erin who brought the child to my office, were very much pleased with the result. As they prepared to leave the office I asked him if this was his child, and the look of indignation he presented at once, also his reply—"Do you suppose I would be the father of a naygur?"—was sufficient recompense for the effort made in removing the foreign substance.

Case III.—In May, 1873, Mr. H., aged forty years, was referred to me by Dr. Bates, of Lebanon. While cleaning his teeth he had accidentally swallowed a plate with three teeth in front, one lateral tooth, and one farther back. He suffered considerable discomfort in the œsophagus for twenty-four hours, the plate evidently lodging there. He was given dough in several portions to swallow, then castor oil quite freely, and at the end of thirty-six hours believed the foreign substance had passed into his stomach from the relief afforded. On the third day he passed the plate per rectum. (Fig. 2.)

Case IV.—In August, 1873, Mr. J. H., a cattle dealer by occupation, had a reputation for being an enormous eater —that is, he would eat a very large meal and then fast for a day or two without any discomfort. A story is told about him that while loading his stock on a cattle barge he went into a neighboring hotel for dinner. The landlord said to him that "the meal was not quite ready, but, inasmuch as Mr. H. was in great haste he "might go into the dining-room and help himself." A roast pig was part of the dinner. The landlord was absent from the room for some little time, and on his return the guest asked him with some earnestness, "Landlord, have you any more of those little pigs?" This is but an illustration of his enormous appetite at times. Some few years after, while eating at a restaurant, and in great haste, he swallowed a large portion of meat, choking to death before any one could give him relief. It will be observed (see Fig. 3) that the meat was some four inches or more in length, and that part of it lodged in the œsophagus, part in the trachea—rather more in the latter than in the former. A good vigorous introduction of a finger here by some grandmother would probably have saved his life.

Another case occurred very soon after of a somewhat different character.

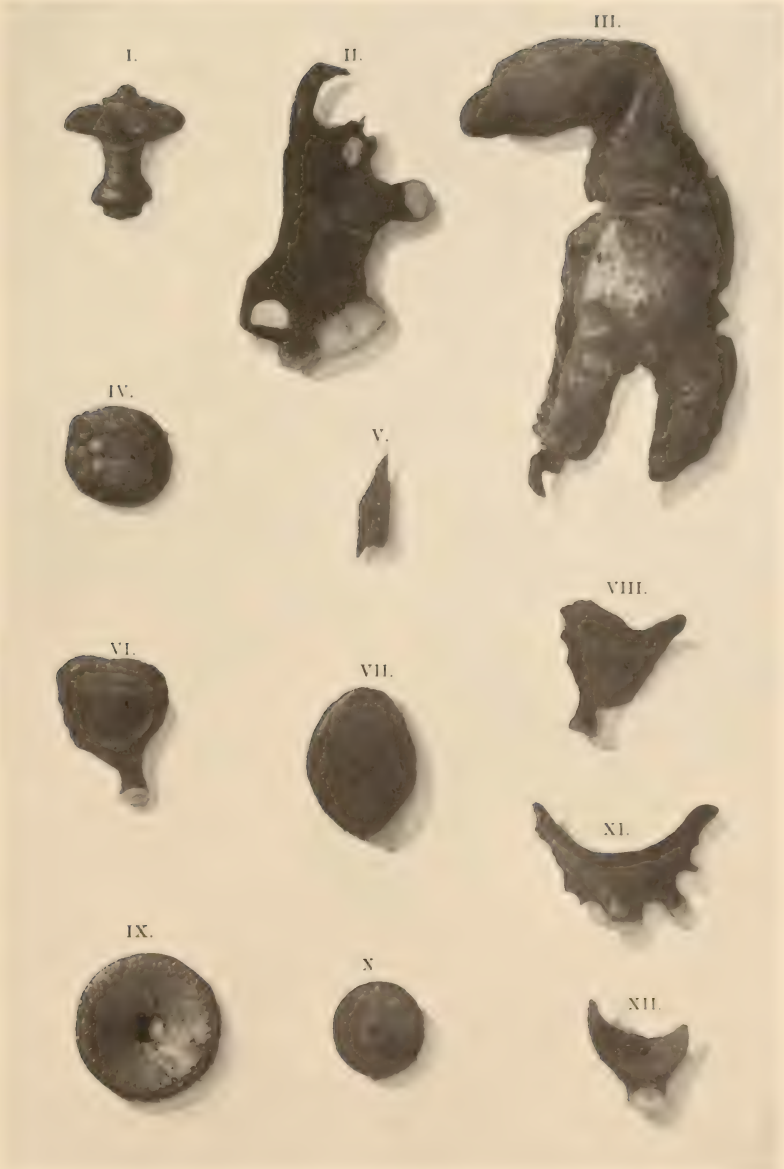
Case V.—Mr. J. G., a man who lived by the contribution of his friends, being very hungry was ordered a good dinner at a restaurant; he began with oyster soup. He ate so hurriedly that it attracted the attention of some people

who were sitting at a neighboring table. Soon after they observed his distress, his anxious expression of face, and great discoloration, but before anything could be done—although a physician was sent for in the near vicinity of the restaurant—the patient was dead before he arrived. On post-mortem it was found that a cracker, very hard, had lodged in the œsophagus just below the cricoid cartilage and produced suffocation. (Fig. 4.)

Case VI.—November 3, 1890, Mr. A. L., while eating of chicken, believed he had swallowed a portion of bone. He was brought to my clinic at the Albany Hospital nearly three days after the accident, and on passing a small, bulbous-pointed œsophageal bougie I could distinctly locate the foreign substance about ten inches from the teeth. Passing a bristle probang I succeeded in removing it, but the hemorrhage that followed was very profuse. The patient, however, made a good recovery. He was put upon teaspoonful-doses of olive oil after his meals for some time after. Three years after the accident he was in good condition, without any evidences of stricture of the œsophagus. (Fig. 5.)

Case VII.—April 27, 1887, Mr. O. R. P., aged twenty-seven years, while drinking from a tin pail loosened his plate with an artificial tooth attached, with the pail, and immediately he realized it was lodged in the œsophagus. An effort was made to push it down into the stomach by his attending physician. Not being successful, the case was brought to me. I made one attempt with forceps to remove the plate, but the bleeding was so profuse that I desisted and did an œsophagotomy, from which operation he made a good recovery, but died not long after from apparent abscess in the apex of the right lung. I am of the impression that the attempt here to remove the plate produced the hemorrhage, also caused some deep laceration of the tissues, and, becoming infected, may have resulted in the abscess. (Fig. 6.)

Case VIII.—October 21, 1893, Mr. S. H., aged sixty-two years, while eating peaches got some juice in the larynx, causing coughing. During the stage of coughing he swal-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lowed a peachstone. This occurred on Thursday, and on Friday his physician saw him, but could not touch the stone with a bristle probang. At this time the patient swallowed with very much difficulty. Saturday I passed a bulbous-pointed metal bougie, and could locate a stone near the cardiac opening. On passing the sponge-pointed probang I could not locate it, but thought that it went into the stomach. Patient was given a pint or two of warm milk per stomach tube and the case watched. He remained in the hospital, and on October 28th the stone passed per rectum. (Fig. 7.)

Case IX.—June, 1894, Mr. J. S., dental surgeon, was fully aware that his plate, with one tooth, was somewhat loose, but thought there was no particular danger. In laughing the plate became loosened, and before he realized what had occurred it slipped into his throat and passed down into the œsophagus. He came to me—a distance of some fifty miles—the next morning, and was suffering quite a good deal from mental distress and inability to swallow. With the bulbous-pointed œsophageal bougie there was little trouble in locating the foreign substance, just above the cricoid cartilage. He was very anxious to avoid an operation. On explaining to him the danger of attempting to withdraw the plate with forceps he assured me there were no sharp points about it, and that he would much rather take the danger of its removal that way than by an operation. Therefore, I made a careful effort with the curved forceps, and in the second attempt removed the plate (Fig 8) with no great distress. No bleeding followed, and he made a good recovery.

Case X.—Mr. C., a middle-aged man, a patient of Dr. B., of this city, who saw him when the accident occurred, swallowed his artificial plate with two teeth attached, and the doctor very wisely desisted from any great surgical interference at the time, but watched him somewhat carefully, the patient evidently being comfortable. Dr. B. came to my office some three days after the accident, asking me to go with him to see the case, but as I was just on the point of leaving the city I asked him to bring the patient to me the

next morning. In the meantime he examined the patient's throat carefully to see as to whether there was a foreign substance there or not. In so doing he succeeded in reaching the plate with the curved œsophageal forceps, and removed it. The patient had suffered very slight inconvenience for the three days the foreign substance remained in the œsophagus, but the man had a very large throat, and I presume this accounted for the little difficulty he had in swallowing.

Case XI.—Master W. D., aged five years, accidentally swallowed the inner portion of a cloth button (see Fig. 9), and immediately experienced considerable trouble in swallowing. This condition lasted for twenty-four hours, very much to the distress of his parents and himself. I was about to examine the œsophagus with the bristle probang when the little fellow exclaimed that "he felt better," the foreign substance evidently having dropped into the stomach. No effort was made at giving physic, but at the end of the fifth day the button was passed per rectum.

Case XII.—May 5, 1894, Master W. W., aged ten years, while playing with a tiny penny whistle accidentally swallowed it. He had trouble in swallowing immediately afterward. An attempt was made by his physician to push it down into his stomach, but did not succeed. His trouble in swallowing continued, and three months afterward he was brought to the Albany Hospital. On examination with a metal probang I could locate the foreign substance low down in the œsophagus. The patient was greatly emaciated, could swallow only a little milk at a time, and no solids. Every preparation for an œsophagotomy was made. With the hope that I might possibly remove it, I made use of a medium-sized bristle probang, and succeeded in my first attempt. The little patient made a good recovery. (Fig. 10.)

Case XIII.—June 9, 1894, Mrs. A. S., aged thirty-six years, while eating breakfast choked on a piece of bread and a hard-boiled egg. She had a sensation of fulness in her throat, and tried to vomit, after which she went to lie down, when she discovered she had swallowed a plate and one tooth

which was attached. Attempts were immediately made to remove the plate, but without success. She was sent to me by her physician, but her throat was so swollen and inflamed that nothing could be done until this was reduced. This was done by the use of sprays, after which the plate was located seven and one-half inches from line of teeth. Œsophagotomy was performed at the Albany Hospital, June 18, 1894, and plate removed. (Fig. 12.) Wound closed with drainage. There was some temperature, and considerable discharge from the tube, which was offensive for the first few days. Wound was syringed out with boric acid solution. The discharge gradually lessened, tube was removed, and wound partly healed by granulation. Patient was fed per rectum for the first two days, after which she was given milk. Could swallow well, but a large amount of the milk came out through the tube. Has remained well ever since, with no symptoms of stricture.

Case XIV.—Mr. F. S., aged twenty-seven years. In December 1896, while laughing accidentally swallowed a plate containing two teeth. An effort was made by his family physician to remove the plate with œsophageal forceps, but he was not successful. When brought to the hospital I did not make any attempt in that direction, but advised and did an œsophagotomy at once. The œsophagus was closed with interrupted sutures, but did not hold, and on the third day liquids escaped, yet with care and packing with iodoform gauze it healed nicely by the thirteenth day. The patient made a good recovery. (Fig. 11.)

This case illustrates a simple œsophagotomy.

Case I. I think illustrates strongly the necessity of the use of the metal bulbous-pointed bougie to locate the foreign substance, instead of the olive-pointed bougie or the bristle probang. This point has been very earnestly dwelt upon by Dr. Abbe in a report of his cases of œsophagotomy, and yet this is a most remarkable case, considering the length of time the patient went on without serious symptoms.

Case II. is strongly impressive in that the substance was too large to go down into the œsophagus, but produced sufficient pressure from behind to cause strangulation.

Case III. is quite wonderful in that from the size of the plate and its irregular angles one would suppose it could hardly pass out from the œsophagus and through the intestinal tract. The method of having patients swallow portions of dough is worthy of trial, particularly in cases where children swallow tacks and such sharp substances.

Cases IV. and V. tell their story. It is almost impossible for a physician to reach such cases in time, and the consternation of the bystanders is such that they are not able to exercise such skill as they possess, which would in some instances save the life of the patient.

Case VI. is one in which we feel strongly tempted to try such an instrument as the bristle probang, and yet it is a dangerous procedure, and should be done very carefully, no force being employed.

I believe the efforts in Case VII. were decidedly bad, and resulted in the formation of the abscess.

Regarding Case VIII., in passing the sponge-pointed probang for the purpose of pushing a foreign body into the stomach, very much will depend upon the nature of the substance. Anything like a peach-pit, as illustrated by this case, can be reached in safety, but it is only in such a class of cases we should attempt it.

Case IX. illustrates the danger of a patient wearing a plate that has become loosened, does not remain in position firmly, and yet the effort at removal seemed justified, because of the assurance of the patient himself that the plate contained but one tooth and that there were no sharp angles. The effort at removal proved successful and relieved the patient from the operation he so much dreaded.

That a foreign body will lodge in the neighborhood of the cricoid cartilage and remain without any great embarrassment is undoubtedly true, as proved by Case X.

That foreign substances will remain for a short time in the

œsophagus and then drop into the stomach is also undoubtedly true, but they are usually flat articles, like coins or fruit-pits, as Case XI. illustrates.

Case XII. is quite a remarkable one. The little fellow was really starving to death, and yet the very simple use of the bristle probang relieved him promptly.

Regarding the operation of œsophagotomy, I should be inclined to close the œsophagus with catgut sutures, and for twenty-four hours feed the patient per rectum, then to pass the soft rubber tube through the nostrils into the stomach and feed in this way. Would keep the wound packed carefully with iodoform gauze, securing drainage in this way, not treating the œsophagus as an open wound, as I believe we will lessen thereby contamination by the swallowing of food. It is quite wonderful that stricture of the œsophagus seldom follows this operation.

All of these operations were done on the left side of the neck and the foreign substance removed with short, curved forceps. In each case I used a steel curved sound, introduced it down into the œsophagus, and projected a prominent point in that manner.

REPORT OF CASES.

First—A Five-gallon Ovarian Cyst Removed from A Girl of Seventeen Years.

Second—Dermoid Cyst Complicating Pregnancy.

By R. Kime, M.D.,
Atlanta, Ga.

Case I.—Miss R., from North Georgia, referred by Dr. F. C. Richards. Admitted to Atlanta Retreat August 11, 1898, aged sixteen years, being seventeen on August 13th.

First flow at eleven years of age; irregular three to six weeks, lasting three to four days, but of longer duration last two or three months before admission. Bowels constipated when not taking laxatives; temperature ranging from 99° to 101° F.; pulse, from 66 to 104 per minute, variable and weak; abdomen immensely distended and encroaching on the chest; patient weak and anæmic; breathing difficult, with occasional attacks of palpitation of the heart; digestion very much impaired. The girl was small and slender, her weight being probably about seventy-five or eighty pounds, after removal of the tumor. Was kept at Retreat five days for preparatory treatment. Distention of abdomen increased perceptibly each day, as observed independently by the patient, nurse, and myself.

Tumor removed August 16th, assisted by Drs. Hurt, Collins, and Stockard. Ether given by Dr. J. A. Childs, who feared death from weak action of heart and obstructed breathing. Operation lasted forty-five minutes. Found cyst adherent to omentum (tied off at three points with silk) and also to parietal peritoneum in right inguinal region at a point

of inflammation, due to suppuration; separated without rupture. After removal of the cyst, half-a-pint of pus was evacuated from this point. Tumor had a broad pedicle; ligated in sections from left broad ligament. Right ovary normal and not removed. In puncturing the cyst with ovarian trochar to draw off the contents—a thick, viscid, greenish-straw-colored fluid—the wall, being quite thin and brittle, ruptured, allowing part of the fluid to escape. The amount drawn off into a bucket measured thirty-three pints, and it was estimated one gallon was lost on the towels, table, and floor. After removal by puncture of numerous small cysts, about one-half gallon more fluid was obtained, making a total of over five gallons. In operating a median incision of about six inches was first made, then enlarged to nine inches, which contracted to about five inches as soon as tension on the abdominal wall was removed. Found it very difficult to introduce needle through the contracted, thickened skin, using through-and-through silkworm-gut sutures. Abdomen flushed with sterilized water, glass drainage-tube inserted, and wound dressed as usual.

Very little shock, and the patient progressed nicely after operation. Bowels moved second day, and kidneys acted seventeen times the first twenty four hours, gradually lessening in frequency thereafter.

During evening of second day evidences of commencing bronchitis developed. Third morning the patient had a cold stage, followed by pneumonic inflammation, with pulse of 140 per minute; temperature, 103.2° F., and respiration, 40, with the most marked cyanosis I ever saw. Used hypodermics of strychnine and digitaline every three to four hours, quinine sulphate and camphorated Dover's powder every four to six hours. A cough mixture of codeia, muriate of ammonia, spirits nitre, ether, and syrup prunus Virginiana was used. Calomel, one-eighth grain, was given with quinine to arouse secretions.

The pneumonic inflammation soon ran its course, and the lungs gradually cleared up, while the pulse remained high for

several weeks. The patient made a complete recovery, and returned home five weeks after operation.

This case is reported not because it illustrates anything new in operative technique or pathology, but to direct attention to the size of the tumor removed, as compared to the age and size of the patient, and also to note accompanying complications.

Case II.—Mrs. W., aged twenty-six years, married seven years, had three children, youngest three years old. Labors all difficult, the first forceps delivery; two miscarriages, last in March, 1897, at which time I saw her when she had been in labor three days, the physician in charge being detained with another case. Found her with severe pains, labor obstructed by semi-solid mass filling the hollow of the sacrum. Placed the patient in exaggerated Sims position, carried tumor upward, allowing the fœtal head to enter the pelvis, and delivered within thirty minutes.

Did not see the patient again until she called at my office, July 6, 1897, and reported having had more or less pain, elevation of pulse and temperature, with occasional chills since March. No menstrual flow since lochial discharge checked. An examination revealed the uterus anteverted, pushed to the left and up above pubes. A large cyst in Douglas' pouch and right broad ligament the size of a child's head, semi-solid, adherent, tender and painful, was found. Uterus somewhat enlarged, with softened cervix; vagina slightly darkened in color.

A provisional diagnosis of pregnancy complicated by suppurating dermoid cyst was made. Patient watched a few days. Found pulse 90 to 100, temperature 99° to 101° F., with occasional chills, but she refused operative measures until September, when she consented to vaginal incision and drainage. The extensive, firm adhesions, stage of pregnancy, and low vitality of the patient were not favorable to cœliotomy (abdominal). She was taken to Atlanta Retreat September 8th. Ether given, vaginal incision made, and three pints

of cheesy, purulent, fetid matter removed, in which were some small bunches of hair. Cavity irrigated, disinfected, and drained with rubber tube, and packed with gauze. Marked nausea and vomiting for three or four days after operation, then she gradually improved until the 16th (eight days after the operation), when she miscarried.

Called early in the morning and found fœtus in the vagina, free hemorrhage, and placenta in uterus. Patient weak and anæmic, and almost pulseless. Had to remove placenta as rapidly as possible with forceps, curette and tampon uterus; work completed in a very few minutes. At this time the patient was unconscious, and I was unable to count radial pulse. Used hypodermics, saline solution, and stimulants, patient rallied and slowly recovered, without any infection of uterus, septic or putrid. Drainage of cyst kept up for some months, then dispensed with. Uterus has returned to normal size; flows regular; no discharge; cyst cavity filled up; very little evidence of cyst-wall left behind, and patient in better health than for years.

I consider the vaginal incision a life-saving measure in this case, and justified by the results. The patient admitted afterward that miscarriage was due to her having gotten up and walked around the room and to the closet during absence of the nurse.

DIAGNOSIS AND OPERATIVE TREATMENT OF TUMORS OF THE LOWER MAXILLA.

By Edmond Souchon, M.D.,
New Orleans.

The whole of the clinical and practical interest of the tumors of the lower maxilla rests upon the size and situation of the tumors and upon the peculiar points of the operative treatment.

First, as to size. *Large tumors—i. e.*, tumors of about 3½ inches by 2½ inches and above, all require resection of the bone, partial or total, whether they are false or true, benign or malignant.

Small tumors—i. e., of about 2½ inches by 1½ inches and below, are all curable by gouging or enucleation, except the various forms of carcinoma and sarcoma, with the most notable exception, the sarcoma myeloid, or giant-celled sarcoma.

By going over the list of the small tumors of the lower maxilla which can be cured by gouging and enucleation we find the following: Tumors, liquid, formed by serosity and the like, such as cystoma, serous; cystoma, mucoid; cystoma, dermoid, oily; cystoma, hydatid. Tumors, liquid, formed by blood and serum, such as hæmatoma, varix, angioma, cystoma sanguineous, aneurism. Tumors, liquid, formed of lymph, as lymphangioma. Tumors, liquid, formed of pus; cystoma, purulent, formed by cocci or tubercle bacilli. Tumors, solid, formed by a foreign body, such as an encysted ball or invaginated sequestrum. Tumors, solid, formed of parasites; tuberculoma, syphiloma or gumma persistent, actinomycosis. Tumors, solid, formed of chronic inflammatory

products—*i. e.*, cellulitis, indurated; periostitis; ostitis. Tumors, solid, formed of clotted blood—*i. e.*, hæmatoma, solidified or fibrinous. Tumors, solid, formed of so-called homogeneous tissues—*i. e.*, myxoma, lipoma, fibroma, myoma, chondroma, osteoma, odontoma, angioma solidified, neuroma, and lastly sarcoma myeloid, or giant-celled.

Small tumors cured only by partial resection are the other forms of sarcoma—*i. e.*, round and spindle-celled, small or large.

That sarcoma myeloid is curable by gouging and enucleation is most noticeable, especially when we remember that sarcoma, in a general way, is the most malignant of all malignant growths.

We do not here mention carcinoma and epithelioma because the primary forms in bones are most rare, if they do, indeed, exist.

The diagnosis of sarcoma is made by a stroke of the gouge into the tumor before resection of a small tumor. The peculiar and characteristic aspect of the section surface will at once give a good idea. A microscopical examination on the spot also, after freezing the chipped portion, will often settle the point.

In case of doubt, proceed as if it were a benign tumor and gouge it out.

After the operation a more thorough examination, or an inoculation on a lower animal, will remove all doubts.

The advantages to the patient of having an entire jaw fully justifies and even commands that course.

At any rate, observe the operated spot closely, and as soon as any sign of a return manifests itself resect at once and resect unsparingly.

As to the situation of large tumors requiring partial resection, the following practical points are important:

Tumors requiring the *removal of the horizontal branch* of the bone interfere very much with mastication, as most of the teeth are also removed with the bone.

Large tumors requiring the *removal of the vertical branch*

alone, or along with a part only of the horizontal branch, call for disarticulation, and not section of the vertical branch with the saw, thus securing a greater chance against a return of the disease. The remote result is better, because enough of the bone is left with sufficient teeth in it to be of good service in masticating. Very often, however, the remaining bone is deviated by the action of the muscles, so that the lower teeth do not strike the upper ones properly when the jaw is closed, thus interfering seriously with satisfactory mastication. This condition requires the adaptation of peculiar contrivances, such as splints or props with strings to keep the bone in good position during the act of mastication.

Large tumors requiring resection, but *sparing the symphysis of the maxilla*, are more favorable, for reasons explained further on.

The operation itself brings forth the following peculiarities, special to itself or to operations on the mouth or face:

1. The *tongue* must be threaded with a strong thread. The thread must be stout, as a fine thread, though strong, may cut through like a knife. It must not be too close to the tip, as it might tear through. The traction must be gentle, as force might cause enlargement of the thread-hole without necessity. The use of this thread is to prevent the tongue from falling back into the pharynx, thus causing asphyxia and death; also to pull the tongue to one side or forward when necessary.

2. Thorough *uninterrupted anæsthesia*, with the cone alone, is often impossible, because of the necessity of removing the cone to be able to operate, when the patient soon recovers from the effect and the operation has to be stopped to allow the cone to be replaced, etc. Hence the necessity of using a tube through the nose and an apparatus that will inject into the throat the vapor only of the chloroform or ether. Such an apparatus has been devised by the writer, which he has called the "anæsthetizer," or "chloroform vapor injector." By its use the cone is done away with, the anæsthesia is continued uninterruptedly, hence saving of time, of blood, of shock, etc.

Unruly patients who take the anæsthetic badly, and cannot be kept quiet so as to permit proper procedures, are in risk of losing their lives from hemorrhage.

3. The *arteries injured* in the operation are the facials and sometimes the temporal, the internal maxillary, and the external carotid, the three latter when disarticulation has to be done.

When the disarticulation is difficult there may be a good deal of loss of blood from these arteries, especially the external carotid. Preparations must be made beforehand to clamp the trunk below very quickly. For this purpose disarticulation should not be begun until the bone has been sectioned by the saw and all the structures dissected away except those around the condyle. The tumor is then used as a lever, and the condyle twisted around toward the knife. This must graze the bone all the time, when all is safe.

4. The *dissection of the flaps* must be conducted so as not to include the mucous membrane of the mouth until the last, as the blood may flow into the throat and larynx and cause trouble.

5. The *teeth*, which might be in the line of the saw, must be extracted, and, also, before the mucous membrane is sectioned.

6. The *bone* is then sectioned with the most convenient saw. Sometimes it is necessary to complete the section with the chisel and hammer, thus saving the extensive dissection which the use of the saw throughout would require.

7. Now comes the important procedure of inserting a *properly shaped silver wire* into the sectioned extremities of the bone. The wire has to be prepared in advance, and must be properly fixed into the ends of the bone; it must be about an eighth of an inch in thickness. It is destined to support the soft parts by taking the place of the removed bone. The sectioned insertions of the geniohyoglossus muscle of the tongue and the frænum must be stitched to it firmly.

Tumors calling for the *removal of the vertical branch and all of the corresponding horizontal branch, but leaving in place*

the symphysis of the maxilla, to which the geniohyoglossus muscle is inserted, do not require so imperatively the use of the wire, and the deformity which follows is much less marked than when the symphysis has been also removed.

8. The *mucous membrane* is stitched together over the wire so as to actually close the cavity of the mouth, then the skin is stitched under the wire, leaving a small gauze drain in the wound.

Complications secondary are represented here by the possible occurrence of œdema of the glottis, due to any excessive swelling following the operation.

It must be provided for in advance by procuring a tracheotomy tube of extra length. An ordinary tube may be lifted out of the trachea by the increase of the swelling, thus baffling the effort at relief. Intubation of the larynx is preferable, but the same remarks also apply.

The results remote vary according to the amount of bone removed and the more or less perfect possibility of keeping up sufficient nutriment.

The silver wire is sometimes well tolerated, and should then be left in place permanently. If not well tolerated by the tissues it should be sectioned through an incision on the middle line and each piece removed separately.

Prothetic attempts have been made repeatedly to use red hard rubber jaws and the like, in place of the wire, and some cases have given very fine results in the hands of skilful, painstaking, and ambitious dental surgeons.

However, in cases where the artificial maxilla is not tolerated by the tissues and has to be removed, the procedure amounts sometimes almost to an operation. The tissues having cicatrized firmly over it makes it more difficult to remove than might be supposed.

ELECTRO-THERAPY.

By J. McFadden Gaston, M.D.,
Atlanta, Ga.

A study of the most appropriate means of developing the methodic application of electricity, under the following headings:

1. Define electricity as it is generally found, and describe it in its ordinary manifestations.

2. Give its forms and classify its general relations.

3. To discover the proper apparatus to develop its properties, and to present the conditions for its application to disease.

4. To study its effects in tissues, and its relations with the normal and abnormal state of the human body.

5. To notice its influence in various diseases and to show how they are properly cured.

6. To exhibit the knowledge of this matter and to reduce it to a system, so that electricity may be profitably employed.

First. In the first place it is necessary to give an idea of the term, electricity, which is a word derived from the Greek, *electron*, and means amber, as this was the substance in which electricity was first developed by experiments, and hence was considered the only origin of it.

Soon after this it was also developed in other substances, and now we know that electricity exerts influence in the majority of substances in the material world.

The earth is a great reservoir of electric fluid, and the clouds which float in the air, in their rapid passage, develop so much electricity as to split trees and to rend rocks.

The electric fluid in our bodies courses along insensibly, but

even so, it can be distinctly manifested on any occasion when the means are employed for its development.

We do not know the constituent elements of electricity, but we know its effects; and thus defining it, we should say that electricity is a kind of delicate matter, or a rare fluid, which is inappreciable while at rest, but can manifest itself with great force when it is set in motion, and by means of certain movements its powerful action is eliminated.

All created matter is dominated by the influence of electricity, being manifested in the law of gravitation, and it may well be that molecules and atoms of solid masses are united by the force of electric attraction, as iron is attracted by the magnet on account of the currents of electric fluid which circulate around it.

This power of the magnet being distributed among the components of any solid mass causes them to attract each other with the force of thousands of pounds, and exactly so may be explained cohesion.

The fundamental principle that masses charged with different electricity attract each other, and those of like form repel each other, sustains the equilibrium of material objects, and in case of the approximating elements having a change of electricity, these seek to unite and become neutralized, returning to the normal state.

The constituents of electricity, being ordinarily in equilibrium, have a movement when they are separated so as to be perceptible; and this perceptible movement on the part of the constituents of one kind is generally accomplished by friction, and in another by chemical action, which serve to develop active electricity ; it being the case that as long as neither of these processes is employed, electricity is passive. Being in equilibrium, it is always quiet, but if the equilibrium is disturbed, it is manifested in action by recognized properties and effects.

The difference in the electric state of the clouds causes the attraction of one for the other, until the masses of vapor unite and produce rain.

The experiments of Franklin to conduct electricity from the clouds to the earth by iron wire shows the attraction between electricity in these two bodies, and from this fact we get iron conductors extending from the highest points of houses to the ground. Buildings may be saved from lightning in this way, and the electric fluid passes insensibly from the clouds to the earth, where it becomes neutralized. The lightning rods should have sharp points for the passage of electricity to take place quietly, because points have the property of attracting and discharging electricity, and may also give exit to the surplus accumulation of electricity.

Second. We pass on to make two general divisions of electricity, static and dynamic, or in other words, local and that with a current.

The first is produced in various substances by friction or other mechanical movements which interrupt its equilibrium; and the latter by chemical action between different substances. Beside these qualities, the form of induction which may be manifested independently of any process, and only in consequence of the approximation of the other mass charged with electricity. This form appears independent of the interposition of a non-conducting substance, and has no need for a means of conduction for its manifestation; but when the two substances are brought in contact, the manifestation stops instantly.

Induction is known by the name of Faraday, on account of the experiments made by him for its development. Static electricity is known by the name of Franklin. Electricity developed by chemical action upon metal plates, placed in acidulated fluid, bears the name of Galvani, in consequence of his experiments. Voltaic, or the electricity of Volta, is a modification of the continuous current, and follows the law of Galvani in nearly everything, but with less intensity.

Either of these forms has the quality of positive and negative in its manifestation, and one of these qualities accompanies the other like the shadow does the body, so that one is the complement of the other existing simultaneously in their development.

In the case of static electricity, vitreous substances in the development of electricity have a positive property, and in resinous substances it is a negative property which manipulates itself.

In electro-dynamics positive electricity is shown in copper, and negative in zinc, and they change one to the other in the transmission of each one on the side of the circuit, so that it passes in its course through opposite directions.

The way in which electricity is accumulated is by means of isolation, which consists in the use of glass or other non-conductor, to support the material to serve as an accumulator, and thus being charged with the positive or negative form, remains at rest until a conductor is presented extending to the earth, where it is scattered.

The atmosphere, being damp, serves as a conductor, and the accumulation would be wasted little by little in this manner.

A spheroid mass being charged and isolated, remains charged with electricity until the atmosphere draws it away; but in case a mass is ovoid the electricity with which it is charged gradually leaves, and if it has a point, it soon escapes, so that if it has a thin and smooth prominence it will scarcely hold electricity.

Experiments to eliminate it in the dark show the positive current in the form of a brush, and the negative in the form of a star.

It is not only the escape of electricity as described above, which is presented in the dark, but also magnetic polarity is perceived by persons in which the sensibility of the nerves is sufficiently exalted.

The manifestations of electricity produced by various means differ among themselves, but there are many points of correspondence, and we cannot establish which should be the line of distinction.

The relations of quality and intensity in the static and dynamic are in inverse proportion, and the smallest amount of the former is more manifest than the greatest amount of the latter, giving a strong shock when it is of static, and making

little impression when it is of the dynamic, except if the elements developing it are increased, and so increases the intensity, we will yet reach a better knowledge of these relations.

Third. I do not propose to touch upon all the apparatus which are employed for the development of so many varieties of electricity, but I shall notice some of the best known in the scientific world and generally employed in the practice of this art.

The static is developed in two forms, the positive being the result of cloth or other material upon glass, and the instruments for reaching this result are various. Negative electricity is produced by friction upon a resinous substance, there being a great variety of conformation to adapt them to their application.

The machine which is generally employed has round glass plates of a diameter of two feet, with an isolated stool, and also a sofa for the use of the sick, isolated with glass jars, in which are placed the legs.

Induction instruments are of two kinds, the one operated by Voltaic piles, and the others in which a permanent magnet furnishes the efficient power.

Galvanism is the result of a combination of three elements of two different metals and of an acid fluid diluted with water. Sulphuric acid mixed with a sufficient amount of water is placed in a glass jar, and a plate of zinc is united by a wire to a plate of copper, and these are arranged in the jar. While the parts are united the current of electricity is developed, running from the zinc to the copper; but it is necessary that the metals and the fluid shall be of such kind that the fluid shall operate with greater force upon one metal than upon the other, and the current of electricity will be more powerful, while the chemical effects of the fluid upon the metal are different, the positive current being of that in which the action predominates, and the negative current that proceeding from the one upon which the action is less.

One pair of the plates is insufficient alone to show properly the effects of the galvanic current, and although the quantity

of electricity is not increased by the increase in the number of plates, yet it gains considerably in intensity and the influence upon the organism is more sensible.

The passage of the current from one single pair of plates is scarcely perceptible, when the conductors are in one's hands; but when a dozen pairs are connected in a circuit, and we hold them, a violent shock results.

By increasing still more the number of pairs, the effect will be greater to a person at the end of the wires, and if the wires are afterward removed a short distance from each other, there will appear a small spark produced by the electricity.

The connection is made by a wire which extends from one plate of copper to a plate of zinc, in separate jars, and finally those terminating the series constitute the electrodes of the machine. The current passes from a plate of copper along the course of the wire to one of the plates of zinc at the other end.

The batteries for developing galvanic electricity vary much; but all attain the same result as that above, of producing and conducting the electric fluid; and one may select one or the other, as it may be most convenient. Among those most recognized are the batteries of Cruikshank, Daniel, Grove, Snell, and Bunsen.

The ordinary apparatus employed in the application of electricity has two or more piles, in which the plates of copper or zinc are alternated, to prevent their contact, placed in a solution of sulphate of copper, and from the last opposite metals covered metal wires extend, isolated, to prevent their contact, and armed with cylinders, balls, brushes, etc., is applied upon the parts to be treated, that which is positive being put on the side of the nervous centres, and the negative upon the extremity of the nerve, so that the current may run along the course of the ramification of the nerve between the muscles.

It is also easy to apply a small battery with two cells in which a solution of sulphate of mercury is used, for this may be carried in the pocket of the physician, and can be placed in any part where the patient is to be treated.

As I have had a considerable experience in the use of these two, I give preference to one or the other apparatus according to the nature of the disease, and the physician may choose from the different ones that one which may be most convenient, holding in mind always that the one which is most simple will be least apt to get out of order, and more easily mended.

Rings and collars of galvanized metal are generally found ready made, and have more effect if they are again put in contact with a strong magnet; and thus, at least, show some work of induction from the influence of galvanism upon the metal.

When the object is to have a collar or other electric circuit, a series of disks of different metals should be put alternately, with the acidulated substance between them, on the order of a Voltaic pile, which can develop the electricity constantly when the extremities are connected.

With this apparatus we may, with certainty get some result. The apparatus of this kind is always ready to produce a continuous current of electricity, and is convenient to apply in cases which require daily or constant repetitions.

In treating of the means of developing electricity, I cannot leave unnoticed the effects of one person upon another, on the order of animal magnetism, which have been practised by Mesmer, and afterward by others.

I have already presented the fact that the human body gives out electricity when we have means of exciting it; and now I declare that the organism is in itself an electric machine, in which electricity is generated and propagated to another with which it may have relations.

I witnessed several years ago an exhibition of the power of one man upon other persons drawn indifferently from a large audience.

With his eyes fixed, and passing his hands from above downward, in front of the individual he succeeded in leaving him insensible and asleep, so that no one could awaken him, and only the operator, at his will, by passing his hands

in the opposite direction, could arouse him out of this abnormal state.

Since that time I have had occasion to witness the most varied experiments, which have given me a confirmation of their force, and to the extent that I myself have practised this process with good result.

At first it was a surprise to me that such an effect should result from means so insignificant, but I finally became convinced of the reality of the appearances, and that the electricity from the body of the operator influences the body of the one operated upon in such a way that the latter becomes totally asleep, and, having no more power in himself, obeys the force of the operator.

In this state the patient does not feel pain, nor does he note anything around him. Needles can be stuck into the most delicate tissues without their producing the least movement, and any limb of the body could even be cut without the patient feeling the least pain; so that operations of gravity done by surgeons are completed without the knowledge of the one upon whom they are practised.

Not being able to give the reason of this insensibility in any other way, I take it that it results from the electric state in which the organism is found.

It is verified by Mr. Washburn that the American Indians are accustomed to cure toothache by the application of electricity, produced by friction of woolen cloth, with the finger of the operator, which is placed on the tooth afterward, causing relief at the same moment. Washburn himself made use of the same process, and had a cure as the result of it, and anyone wishing to try the same may repeat it.

Electricity can be developed in the human body to the point of being manifested in very pronounced effects, and it is proper that I should notice the case of a young lady, the case being well authenticated, which occurred in the United States a few years ago. Walking lightly over a woolen carpet, and rubbing her feet over it, so much electricity was evolved that extending her arm and reaching near a jet of gas, and touch-

ing it the gas was lighted, and every time the experiment was repeated the gas was lighted.

I am encouraged to show the other manifestations of electricity in the human body, by the testimony of Reichenbach, a man well known as a scientist who, in view of his laborious experience in the discovery of creosote and other chemical substances, is free from any suspicion of being mistaken in his investigations.

In his work entitled *Electro-Dynamics, or the Force of Od*, we read that some people can sleep well only when their bodies are placed transversely to the axis of the earth, and with the head in the direction of the rising sun. In this there is no doubt that repose comes from the relation of the electricity of the body to the earth, which is considered as a vast magnet, due to the current of electricity encircling it.

All know that a piece of iron suspended by a piece of silk thread tied at its middle point in the proximity to electric wires, will remain at rest only in a certain position, and from this experiment we may infer that the human body is influenced by currents of electricity on the earth, to remain at rest in a fixed position, and we may establish the principle that the electricity of the body has always this relation to the transverse axis of the polarity of the earth.

Many examples are presented by this author in support of the idea that the electricity of the body is in a state of greater force during the forenoon, gradually increasing from dawn up to midday, and afterward decreasing gradually, losing the electric vigor during the afternoon and night until the early dawn, when it is reduced to the minimum.

Being thus related with the revolution of the earth in the presence or absence of the sun, electric force increases only while the sun crosses the earth and develops electricity which circulates around it.

Many physicians have noticed that the vital force in weak patients obeys the same rule, and that weakness is more apparent in the last hours of the night, corroborating the

observation of Reichenbach on the electric force, which is described as the force of Od.

Recognizing this animal magnetism in the human body, we can at least profit by it by instituting a hygiene more conformable to the nature of the race, and by preventing abuses which the people practice in their domestic life.

The electric conditions which are operative upon the organism in sleep call for the attention of philosophers, and in spite of this state happening daily, the scientific world has not yet given a scientific explanation of sleep, nor does it know in what consists this deadening of the intellectual faculties.

Having in mind the idea of throwing some light upon this subject, if possible, I would note minutely the principles of sleep and its consequences, in my own person, considering that will-power has more or less action in the hours of sleep.

Upon lying down we make up our mind to get up at dawn, and although we are not accustomed to arise at this hour, we awaken at the hour which we have in mind at the moment of lying down, and for my part, if I wanted to wake up every two hours through the course of my sleep, I could certainly awake, and I have done so without losing sleep in the intervals in which I wanted to sleep.

I take it that this will-power in the hours of sleep is very different from anything which happens while we are awake, and all who have practised this are surprised at the facility with which the space of time can be regulated during the night with more exactness than during the day, in which all the faculties are free.

The experience of others could confirm my observation, that an oppressive sleepiness, even during the day, passes over at times, suddenly, leaving the body light and the thoughts free, as though it had been after several hours of sleep in bed, and it is not going to return this time.

A person can be sleepy under circumstances which will not admit of his lying down, but he may sleep sitting or ill at ease in some part, so that he may awake from time to time,

feeling at this time a sudden movement of the brain, as though from fright, which passes away instantly.

Studying these observations in conjunction with other facts in my own experience, concerning the state of the body while asleep, I cannot explain them unless they can be based upon the development of a different electricity at the time when sleep supervenes.

If it had not been so often noticed that sleep comes and goes so slowly, we could meet difficulties in receiving their hypothesis, but the conditions having been noted and studied in all their relations, favor the electric explanation.

In the dearth of other data, I am inclined to believe in the localization of the electricity of the body in the act of sleeping, after the manner in which a Leyden jar is charged. Sleep comes from this separation of electricity outside and inside upon the brain and in the nerve centres, gradually increasing until the individual sleeps profoundly and becomes thus fixed, until his body is rested, or until he receives a fright, when the different parts of electricity are united and the equilibrium is established in the body.

As the positive and negative in the electricity are separated outside and inside of the Leyden jar by the art of the operator, I suppose that nature allows the same arrangement in the human body, and although I am not able to explain as yet the method, I leave it to some one else to explain or explore the arcanum and to present at some future time the more precise enlightening rays.

I have presented this theory without being able to reduce it to a scientific basis; but in view of the fact that the state of the faculties under the influence of animal magnetism corresponds in many points with that of natural sleep, and knowing that is caused by electricity, I think the inference that sleep may also be the result of a change of electricity in the body, is a legitimate induction.

During active life it is understood that the electricity is in equilibrium, but when the body needs rest it may be that the conditions present themselves spontaneously to break up the

equilibrium, and that the electricity of the body changes, so that it produces the result indicated.

The following paper by another may suffice to illustrate the headings marked 4, 5, and 6 :

Electricity has been applied in all the arts and sciences and to a great variety of useful mechanical appliances. The thorough realization of the scope of this wonderful agent is not possible without considering and contemplating the many changes which have been brought about since the important discovery by Galvani.

The electric telegraph first startled the world by the rapidity of transmission and the annihilation of time and space. Then the telephone became a complete revelation of power, and a new impetus to all communication between man and man was given when its many improvements were applied.

In like manner as a motor electricity has made changes in locomotion in every department of enterprise.

While the changes have been more widespread in the above applications of electricity, we doubt whether there could be a more astonishing transformation of methods than that accomplished by the application of electricity to medicine and surgery. Beginning with the Leyden jar, a simple shock was used in certain diseases, while the static machine has been known for centuries to be a powerful therapeutic remedy.

At the same time we find that the most important results have been attained by Galvanic and Faradic electricity.

In treating strictures, tumors, nævi, nervous diseases, the current has been applied with marked and satisfactory cures. The careful observation of data and the compilation of statistics by Apostoli, Betton Massey, and others show that in diseases of women electrolysis is an agent of undoubted merit. In the method of cataphoresis as used by Drs. McGuire, Gaston, and others, most remarkable changes in cell-formation and tissue-proliferation are shown to be made by medicines which can be directly topically applied by the method of transmission from the positive to the negative pole. The ordinary stimulant effect of electricity enables the physician

to administer medicines by its means which would not be borne so well by weak patients. Carcino-sarcoma, adeno-sarcoma, or small-celled sarcoma have been cured by the application of Donovan's solution to them in this way. At the same time an internal exhibition of this drug has been used.

The process of the galvano-cautery has been very well recognized, and by means of snares nasal polypi and adenoid growths have been successfully extirpated, while the hemorrhage in these cases is less than in the process of torsion or of the various cutting instruments that have been devised.

In regard to the cauterizing effects of electricity, we would mention Dr. Betton Massey's process of cataphoresis and the action of gold electrodes coated with pure mercury. The cases which he has treated are cases of malignant growths which are frequently operable, but which in his experience have yielded to the destructive effects of the mercury and the current combined. The cases which he has reported recently have been cases of carcinoma of the mammary gland, and in these cases the axillary glands are also attacked by the electrode in one séance under an anæsthetic.

Dr. E. H. Bradley, of Peoria, Illinois, in a thoughtful article in the Peoria *Medical Journal*, of July, 1898, draws attention to the value of cataphoresis in the sterilization of wounds, showing the direct application of mercury when the bichloride is used and the free chlorine escapes at the positive pole where the bichloride of mercury is applied, while the metallic mercury goes to the interior of the wound and to the negative pole, killing all germs.

He states that iodine is electro-positive and, hence, must be applied to the negative pole of the current, but the results of McGuire in goitre do not bear him out.

The application of the weak galvanic current has also been successfully made in cases of urethral stricture, enlarged prostate; and epilation by electrolysis is a very well-recognized process.

I have recently treated a case by electricity in a rather

novel condition. The nerve of the arm was painful, and a small amount, about one-half grain of cocaine hydrochlorate was applied to the arm along the ramifications of the nerve, and this is always attended with anæsthesia, as is known in cases of extraction of teeth. Another case now under my care is one of a lady with a few extra hairs on both sides of the upper lip, and several on the chin and the neck. The needle is put on the negative pole and applied into the hair follicle.

Half a minute suffices to destroy the follicle. About five cells of a Waite and Bartlett battery are used.

Case of a uterine fibroid was seen this week, with the advice to have electricity applied.

I will close this paper by inserting a letter which, on account of its interest to the profession, has been published :

THAMESVILLE, Ont., June 13, 1898.

J. MCFADDEN GASTON, ESQ., M.D., Atlanta, Ga.:

DEAR DOCTOR : I dare say you would care to know how we are progressing with cataphoresis. I do not know, of course, how much credit is due to your line of treatment, but the fact is that my brother is at present in excellent health, with no appearance of disease about him, whereas over a year ago I had thought that further attempts to save his life would be useless, and I was backed up in this by several good men. Certainly had we allowed the case to take a natural course he would have been dead before now. The tumor was removed as often as it recurred—averaging once in two months. I commenced treatment by cataphoresis on June 24, 1897, and have continued it since, together with the administration of succus alteraus and Donovan's solution. I had to remove tumor three times, however, viz., August 30th. October 21st, and December 31st, and now for nearly six months have not had any sign of trouble. Before commencing this treatment the tumor had been removed five times with an average interval of two months.

Microscopic Reports. First, adenosarcoma of testicle. Dr. Cavan, Toronto.

Second, round-celled sarcoma (first recurrence). Dr. Anderson, Toronto.

Third, carcinosarcoma (third recurrence). Dr. Anderson, Toronto.

Fourth, adeno-carcinoma (fifth, sixth, and seventh recurrences). Dr. Cullen, Johns Hopkins Hospital.

Of course, it is too soon to speak with confidence, but perhaps this seeming prospect of success even, may encourage some one else to persevere.

My experience with this case would lead me, in a similar one, to remove the recurring growths as early as possible. Seeing that there is no room for a radical operation, I would remove only enough tissue to insure complete removal of growth—not cutting as wide as possible, but saving tissues for future operations. I would avoid using ligatures if at all possible, to control bleeding points without them, and I would persevere with cataphoresis, using the positive electrode near the tumor and the negative at a considerable distance from the same. Twice in this case I have had to dissect very carefully the growth from the urethra, and felt sure that a recurrence would take place there, but was agreeably disappointed to find the next appearance at a different part, thus getting as good a result as if I had cut wider, and with a very great saving of discomfort to the patient. The last removal of the growth did not extend much more than one-fourth of an inch away from the tumor.

I have often wondered whether that patient with disease of the penis, whom you mentioned in one of your letters, had received benefit or not. You said another medical man had asked you about your treatment, and proposed trying it with him.

I have to thank you again for your kind assistance and courtesy in this case, and only hope that the termination of it may be such as will place me in a position to more publicly acknowledge the same. I remain,

Very truly yours,

R. N. FRASER.

NOTE.—Since this article was prepared I have received another report from Dr. Fraser, which may be added :

THAMESVILLE, ONT., April 8, 1899.

J. MCFADDEN GASTON, ESQ., M.D., Atlanta.

DEAR DOCTOR : I am preparing a report of my case of recurrent malignant disease, which I will probably read at the approaching meeting of the Ontario Medical Association. I will give an outline of the case reported by you, and would be glad to know the present condition of your patient. I would like also to know whether other cases have been reported which would be of interest in connection with a study of this method of treatment. My patient is now in excellent health, without any appearance of disease—over fifteen months since last removal of tumor. We are still continuing treatment.

I remain very truly yours,

R. N. FRASER.

My response gave him the results of several cases under my observation. The confirmatory results of the treatment of sarcoma by electrolysis and cataphoresis are certainly gratifying to me. The case he mentioned was a boy, whose case I reported to the American Surgical Association on May 4, 5, and 6, 1897. The case was one of small, round-celled sarcoma of the abdominal cavity. He was under my special care from November 25, 1895, to the present time, April 12, 1899. There has been no recurrence. Fully two years have elapsed since the final disappearance of all outward manifestations of induration or cachexia to malignant disease. For three months all treatment has been suspended, with no complaint on the part of the patient.

A DEFINITION OF THE NORMAL POSITION OF THE UTERUS, AND A CONSIDERATION OF ITS SUPPORTS FROM A PRACTICAL STAND-POINT.

By A. H. Buckmaster, M.D.,
University of Virginia.

After knowledge of a subject becomes extensive and accurate it will, sooner or later, crystallize in a definition. This is a great advantage to beginners, for it affords a test by which they may correct false impressions and avoid much unnecessary work. That the definitions of the normal position of the uterus found in the text-books are almost as numerous as the writers, indicates that a satisfactory definition has not been found. Many definitions embody the statement that the axis of the uterus should be at right angles to the plane of the brim, or a little forward of this line, and this implies that the uterus occupies a fixed position. To avoid such a misconception it would be well to substitute for the term "position" the term "path." To be sure, we use the term position to imply motion in a limited space. For example, we speak of the position of the earth in the solar system, but as every one knows that its position is constantly changing, no one is misled. If, however, some one in authority startled us by the statement that the world was out of place we should know at once that a new force had appeared in the universe. There would be no objection, then, to the term "position" of the uterus if we used it as we speak of the earth, but to avoid the prevalent conception that the position is a fixed one it is best to use the term path.

Notwithstanding the faulty definitions, no one can deny that the uterus is a movable organ, for every time there is an increase of abdominal pressure caused by descent of the diaphragm in respiration the pelvic floor is pushed toward the outlet, carrying with it the uterus. It may be said that though the uterus is in constant motion, it has no path such as would justify us in comparing it to the earth's orbit; but if we study the movements of the uterus carefully we will find that it has a regular path, which is determined by the forces always acting to a greater or less degree in the pelvis. The earth would be out of place if it occupied on the 2d of May the position it should have occupied on the 1st. So with the uterus. If it stays forward when the normal forces of the pelvis push it backward it is out of place, and if it is backward when the normal forces push it forward it is out of place. Suppose, by careful observation of a healthy woman, we determine the path of the uterus—that is, its normal range of motion; now, the uterus may be in any part of this path and yet be out of place. If it is lying forward, with a full bladder, this is abnormal; if it is backward, with an empty bladder, this is likewise abnormal. Therefore, any definition of the position of the uterus must take into account the forces that move it and the supports that resist such forces.

The position of the uterus is determined by the following conditions:

1. Abdominal pressure.
2. Weight of the uterus.
3. Shortening or elongation of the uterine bands.
4. Distention and emptying of the bladder and rectum.

1. The matter of uterine supports is usually made unnecessarily complicated. They may be divided into two bands: one in front and one behind the uterus. The anterior band ties the uterus to the anterior part of the pelvis. It is composed of peritoneum, the walls of the bladder, and the anterior wall of the vagina, with its investing fascias. It is exceedingly strong, and contains the urethra. It is attached to the

anterior surface of the cervix, except the *portio vaginalis*, and extends upward on the anterior surface of the uterus. Fig. 1 represents a median sagittal section of the pelvis. It should be remembered that only a portion of the anterior band is seen in this drawing. The part that passes from side to side of the anterior part of the pelvis in the fascia encasing the bladder, of course, cannot be seen in such a section. The

FIG. 1.

posterior band is made up of the tissue which ties the cervix to the anterior wall of the sacrum. It is composed of peritoneum and includes the so-called utero-sacral ligaments. These small bundles of non-striated muscular and fibrous tissue are insignificant supports compared to the broad bands of peritoneum reflected from the uterus to the sacrum at the sides of these ligaments. Dr. Penrose, of Philadelphia, in a

recent text-book on gynecology, says that the utero-sacral ligaments cannot act as suspensory ligaments, because their insertion is higher than their origin in the uterus; but, as may be seen by inspection, the plate he uses to represent a median sagittal section of the normal pelvis (see Fig. 1) contradicts this assertion. If Dr. Penrose had said that the suspending power of the ligaments *per se* were slight I could heartily agree with him, but the reflections of peritoneum that cover these bands are very strong.

FIG. 2.

That part of the pelvic floor immediately under the cervix affords no support to the uterus unless there is a sudden increase of the abdominal pressure. Indirectly it is of great importance to the support of the floor, because its injury puts an undue strain on the other supporting bands by allowing a congestion of all the supporting fascial sheaths.

Having described the anterior and posterior bands, I will try to explain how they act. As the influence of the weight of the uterus and atmospheric pressure differs in different positions of the patient, I will first consider the actions of the bands and the forces that oppose them with the patient on her back. Fig. 2 shows the anterior band alone furnish-

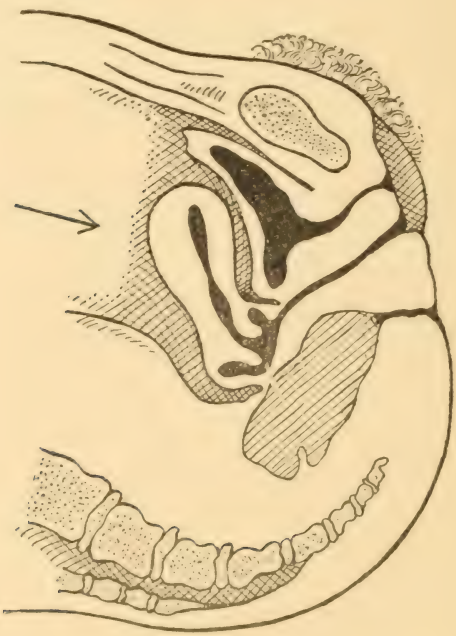
FIG. 3.

ing support to the uterus. Under such circumstances the cervix will move forward and the fundus rotate backward. Test the strength of this band in a nullipara, and it will be found to have great strength and but little elasticity. Notice that in this position of the patient the uterus gets its main support from this band. In Fig. 3 the uterus is shown supported only by the posterior band. The suspensory action of the band is very slight (with the patient on her back), and

the cervix will drop back into the hollow of the sacrum and the fundus rotate forward. The bands acting together, the position of the uterus is about that shown in Fig. 1. The anterior band supports the cervix directly, the posterior band, holding back the cervix, throws the fundus forward.

(2) Abdominal pressure is a very strong force. I knew a case where it forced a nulliparous uterus through the vagina. The patient was a strong German woman, used to work in the fields, and the accident occurred while she

FIG. 4.



was trying to put a bag of potatoes on her shoulder. The abdominal cavity, filled with intestines containing a large amount of fluid material, may be regarded, for practical purposes, as filled with fluid. The amount of pressure will, therefore, be greater with the depth of the fluid. The amount of pressure also depends on the integrity of the abdominal

walls and diaphragm. The way this abdominal pressure is applied to the uterus is a matter of extreme importance. In Fig. 1 it will be noticed that there is a space between the uterus and the bladder. This is incorrect, for the uterus normally lies close against the bladder. When the bladder distends the uterus is not carried up, as represented in Figs. 4, 5, and 6, but the condition is more like that shown in

FIG. 5.

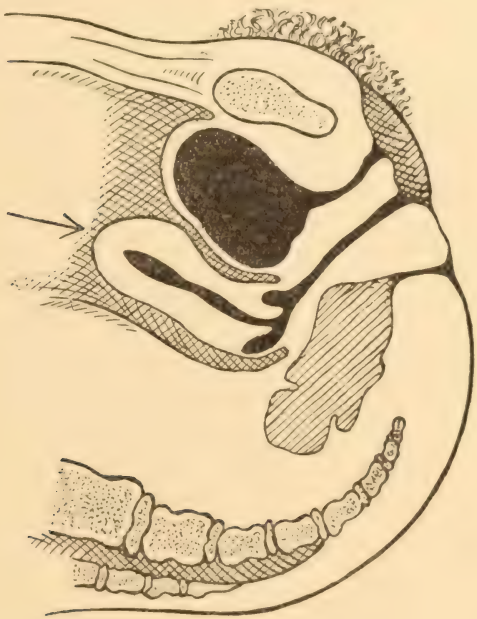
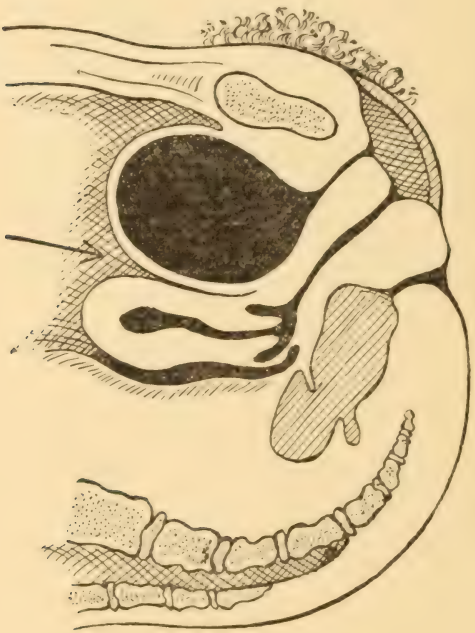


Fig. 7. The faulty representations (Figs. 4, 5, and 6) are taken from a well-known book on gynecology, and represent a conventional, but incorrect idea. The bladder wraps itself around the uterus, as one finds when doing a complete extirpation. After the sides of the bladder are filled it pushes the fundus backward and the whole organ downward and backward, and the cervix somewhat forward. In order that the cervix shall pass forward the posterior band must stretch, and

as it is very elastic it does so readily. We use this distensibility of the posterior band when we drag down the cervix, and it will be noted in such cases that there is very little yielding on the part of the anterior band. As the bladder empties, the posterior band contracts and throws the fundus forward. No time during the filling and emptying of the bladder has the abdominal pressure been exerted on the anterior wall of

FIG. 6.

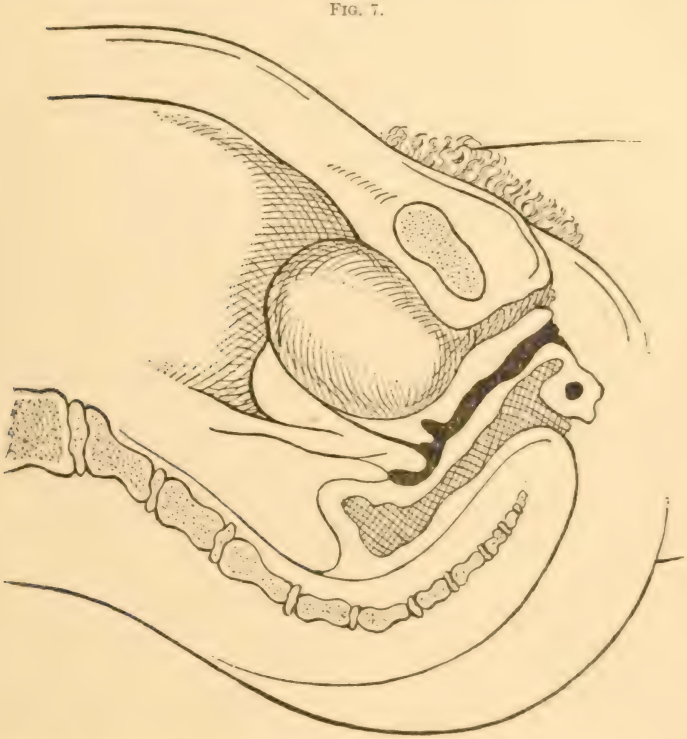


the uterus, because the bladder covers it like a water cushion. If through any mischance the abdominal pressure acts upon the anterior wall, except in the condition of abdominal inversion, it is doubtful whether the uterus can come back, and there will be retroversion; or, if the pressure continued to push the fundus back, retroflexion. The distended rectum pushes the whole organ slightly forward and upward if the

lower part is overfilled, and downward if the distention affects the upper part.

With the patient in the erect posture the conditions are quite different. Turn Fig. 2 so that the figure is erect. The uterus will, under the conditions shown in the figure (absence of the anterior band) turn back, drop down, and then turn backward, It will get no support until it strikes the pelvic floor, and, if

FIG. 7.



this does not stop it, prolapse will occur. In Fig. 3 (turned so the patient seems to be standing) it will be seen that the posterior band furnishes direct support (when the patient is on the back the direct support is afforded by the anterior band). In Fig. 3 the uterus will rotate forward, for there is nothing to keep it back. The action of the anterior band with the patient in this position is to hold the cervix

forward, and thus prevent the fundus from turning forward. Abdominal pressure is greatest in the erect posture, because the weight of all the abdominal contents presses directly on the uterus. A three-months' pregnant uterus is a good example of the force of abdominal pressure, for there are often symptoms of a distressing nature, due to the lack of resistance to downward pressure. When the uterus becomes large enough to rise above the brim these symptoms cease. It is in cases where the anterior band is relaxed that we have the uncommon but intractable condition of anteversion —a condition which causes great distress. To deny that anteversion is a pathological condition seems to the writer to argue a lack of knowledge of the normal supports of the uterus.

In the position of abdominal inversion the conditions differ from those present when the patient is on her back or when she is standing. By abdominal inversion I mean that the patient is in such a position that the upper part of the abdominal cavity becomes the most dependent portion. It is inverted. This rarely happens under ordinary conditions. It is by abdominal inversion that we are enabled to examine the vagina by Sims' and the knee-chest position. And we also make use of it in the Trendelenburg position, and the posture in which we place the patient to examine the bladder after Kelly's method. In the condition of abdominal inversion abdominal pressure ceases to be exerted on the uterus— in fact, the pelvic floor is drawn upward by what is sometimes termed negative pressure. With the loss of abdominal pressure we also lose the influence of gravity as a force to push the uterus downward. To sum up :

1. With the patient on her back the uterus is supported mainly by the anterior band. The posterior band draws the cervix backward and thus throws the fundus forward. Abdominal pressure and gravity throw the uterus forward.

2. With the patient in the erect posture the uterus is supported by the posterior band. The anterior bands holds the cervix forward, and thus prevents the fundus from dropping

backward. Abdominal pressure and gravity keep the fundus forward.

3. With the condition of abdominal inversion (Sims, Trendelenburg, knee-chest) gravity causes the uterus to fall toward the diaphragm, and abdominal pressure (negative pressure) has the same tendency, and the uterus is restrained by apposition of the vaginal walls. If air be admitted into the vagina then the uterus is supported by the anterior and posterior bands.

A uterus is in a normal position if it responds to the forces acting in the pelvis; but it must not occupy such a position that its circulation is interfered with, and when the patient is standing or in any other position (except abdominal version) the abdominal pressure should fall on the posterior wall of the uterus, and the uterus should conform with the movements of the bladder.

EXTRA-UTERINE (TUBAL) PREGNANCY, WITH RUPTURE OF SAC; REPEATED HEMORRHAGE; LAPAROTOMY; CONVALESCENCE COMPLICATED BY SECONDARY ABSCESS OF THE LIVER; TRANSPLEURAL HEPATOTOMY; RECOVERY.

By Rudolph Matas, M.D.,
New Orleans.

The reports of cases of ectopic pregnancy that have been successfully treated by direct surgical intervention while in the grave collapse from hemorrhage that accompanies the rupture of the sac have been so frequent of recent years that they have lost even the merit of novelty. In fact, the literature of the subject is so saturated with clinical and pathological reports which bring into relief every phase of this condition that it is not surprising that the instruction to be derived from the record of individual cases is well-nigh exhausted. Nevertheless, it is not improbable that the mere record of results in operated cases has some value from a statistical and collective point of view, even if only to illumine the prognosis and encourage the surgeon in interfering and hoping for recovery when confronted by the most desperate and apparently hopeless conditions. The present instance, however, is contributed more especially to direct attention to a complication of very exceptional occurrence (judging at least by the universal silence of recent authors and operators), and yet of such gravity and importance as to justify its consideration as

a possible, if rare, factor in the clinical history of the subject.

The complication referred to is an acute, circumscribed suppurative hepatitis, the result, apparently, of portal infection starting in the intestinal walls, or possibly, though not probably, in the peritoneum itself. It is evident that this complication is not peculiar to the convalescence or clinical history of ectopic pregnancy, but may occur in any form of septic peritoneal traumatism associated with intestinal paresis, and more particularly, as in this case, when a septic enterocolitis with putrid stools following immediately after the intestinal stasis of peritonitis.

On Sunday, December 19, 1897, I was called by Dr. M. Herman to examine Mrs. P., an employe of a well-known tobacco factory in this city. I obtained the following facts preliminary to my examination: The patient is a white married woman, aged about thirty years, a native of this city, and of German parentage. She has always enjoyed good health. Has been married several years. Her husband is a healthy man of about her own age. She has been pregnant three times before present conception. The first child is living and well; the second died two months after birth from some obscure nervous trouble. She had a miscarriage subsequently. Her present trouble dates with the suppression of menstruation, which took place about twelve weeks before this visit. The patient believes that she is pregnant. Apart from the suppression of the menses she noticed no change in her health, and attended to her usual duties at the factory until two weeks ago, when, in the evening, while walking in the street from the factory to her home, she was taken suddenly ill with an acute abdominal pain in the hypogastrium. This pain was accompanied by great prostration, dizziness, a sinking feeling, faintness, cold sweat, and a deathly pallor, which was noticed by those who accompanied her. She was in a state of collapse when picked up by her friends, who put her in a cab and took her home. At home she was attended by a neighboring physician, who administered morphine, atropine,

and restoratives. She finally rallied, but regained strength very slowly, always complaining of pain and tenderness in the lower abdominal region. She had dismissed her medical attendant, and was preparing to return to her post in the factory, when on Saturday (December 18th) she was again seized with violent abdominal pains and great prostration. It was then that Dr. Herman, the physician of the factory, was called to attend her. He found her in a collapsed condition, with cold, clammy skin, subnormal temperature, weak, thready pulse, widely dilated pupils, and a colorless, exsanguinated appearance. The abdomen was considerably distended, especially in the hypogastric regions, with great tenderness over the swollen area. Vaginal examination unsatisfactory; the uterus was displaced downward and to the right, fixed and immovable; the posterior cul-de-sac was distended by a semi-fluctuating mass that filled the pelvis. Dr. Herman was convinced that he was dealing with a ruptured ectopic pregnancy. The next day, Sunday, December 19th (two weeks after the first signs of rupture), I examined the patient and found her condition improved. There were signs of a general peritoneal reaction. Abdominal tenderness and distention more marked, but no acute pains, no vomiting. Temperature 99⅘° F., pulse 120, very compressible, but evidently responding to the digitalin and strychnine that had been given since the previous day. A vaginal examination confirmed the results obtained by the attending physician. There was evidently a semi-solid mass, which jammed the uterus downward toward the pelvic outlet and filled the pelvic cavity, projecting to the level of the iliac crest on the left side. The general appearance of the patient was that of profound anæmia. The skin was colorless, the conjunctivæ were exsanguinated, the lips were blanched, and the hands waxy. We feared that she could scarcely stand transportation to a sanitarium, but finally concluded to take the risk, in view of her exceedingly unfavorable surroundings for operative treatment. The patient was admitted to the New Orleans Sanitarium, Monday, December 20th. She was so

weak and exhausted that we feared that she would never be able to survive an operation. She was at once warmed up in bed, after which an ice-bag was applied to the lower abdomen; strychnine was given hypodermatically, and the bed was tilted high up at the feet to diminish pelvic engorgement as well as favor the cerebral circulation. She was constantly watched by the nurse in charge, who administered frequent but small doses of peptonized milk, panopepton, and hot tea at frequent intervals. The nurse was soon able to report that the pulse had improved. Nothing was done that day. The next day, after thorough antiseptic preparation, an exploratory puncture into the swelling was made through the posterior vaginal wall and a syringeful of pure blood was quickly aspirated. This examination also showed that the tumor had not increased. Diagnosis of pelvic hæmatocele, caused by ruptured tubal pregnancy, was confirmed, and we decided that we would operate, but not immediately, preferring to wait a little longer for further improvement in the patient's condition. The peril of delay was thoroughly appreciated, but the risk of operating in so deplorable a condition appeared to us still greater, and we temporized. We were also encouraged in this course by the evident arrest of the bleeding.

On December 21st, while a hot douche was being administered, the patient passed a complete cast of the uterine cavity —evidently the decidual membrane. The expulsion of this membrane was attended by colicky pain and some bleeding.

The picture of abortion was complete, except that no embryo had been expelled. The patient herself believed she had aborted, and expressed herself as being much relieved by the occurrence. She also explained that her first attack of abdominal pain and prostration coincided with the usual date of her menstruation.

From December 20th to the 24th nothing was done except to observe and strengthen the patient. The urine, which was normal, was kept diluted by drinking large quantities of pure water; the bowels were moved regularly by enemata and

saline aperient draughts; the amount of putrid material in the intestinal canal was reduced to a minimum by a careful laparotomy diet, consisting largely of milk, cereals, and cooked fruits. Strychnine, in $\frac{1}{40}$-gr. doses, was kept up steadily every six hours. Under these conditions her strength and spirits improved decidedly. The temperature remained at 100° F., pulse 117, and pains were being subdued, when, on December 24th, the whole aspect of the case again changed for the worse. The pulse became suddenly more rapid, the pallor more marked, and the tumor above the pelvic brim rose higher. The tension in Douglas's cul-de-sac became greater than ever before, and the pains in the hypogastrium grew intolerably acute. It was evident that the time to act had come, and we decided to operate that evening. After thorough irrigation the uterus was curetted and packed with iodoform gauze. The right arm was also prepared for intravenous saline infusion, the median basilic vein being exposed so that no time would be lost in injecting the saline solution, which we had every reason to believe would be required in the course of the operation. A preliminary hypodermic of $\frac{1}{40}$ gr. strychnine and $\frac{1}{100}$ gr. digitalin were also given before beginning with the anæsthetic. A few drops of chloroform were first given in an Esmarch inhaler, after which the anæsthesia was continued with ether.[1] The patient was placed in the Trendelenburg position. A median incision four inches in length was made, and subsequently enlarged to five inches. The peritoneum, which was very tense, bulged into the wound. Upon dividing the serosa a dark, membranous mass appeared, which resembled a cyst. The mass was adherent on all sides, but was well defined above where it was attached to the omentum. Not knowing exactly what it was, I decided, before attempting further manipulations, to tap it with a trocar, but only a little blood came. An effort

[1] Drs. Larue, Gessner, and Delaup rendered most valuable assistance in the operation. The Sanitarium corps of nurses also gave valuable assistance; and it is due, in a great measure, to their constant care and unfailing vigilance in the after-treatment that the patient finally recovered.

was then made to detach it by inserting the hand into the wound, but the adhesions were so intimate with the abdominal wall that I had to incise it by cautiously cutting into it in the median line. After penetrating through a thick cortex of exudates and fibrinous layers (for this they turned out to be) a large quantity of clot and liquid blood gushed out. The hand was now introduced into the cavity of the pseudo-cyst, and its true nature was at once clearly recognized. It was simply a vast hæmatocele which filled the pelvis, forming an irregular ovoid, the centre of which was occupied by the uterus and left Fallopian tube, or, at least, what remained of it. Its upper boundaries were formed by the intestinal mass, which had been displaced upward to the level of the umbilicus, where a wall of soft and recent adhesions, with the omentum and exudates, excluded the general peritoneal cavity. After scooping out over three pounds of fresh clot and blood the remnants of the left Fallopian tube were clearly recognized. A large mass of thick membrane was now felt and peeled off, with an attached layer of dense, fibrinous exudate, from the centre of the left broad ligament, in which it appeared to be fixed and buried.

The Fallopian tube, as stated, existed only in fragments, its central part had evidently been once distended and was continuous with the corresponding broad ligament, with which it formed the irregular, torn wall of a large cavity filled with blood and exudates. The appearance of the parts plainly indicated that a primary hæmatocele had existed in the tube, and that this had ruptured secondarily into the broad ligament, the third rupture taking place in the posterior surface of the broad ligament through a large, ragged aperture from which the blood and ovum had ultimately escaped in the general pelvic cavity. The walls of the cavity thus formed by the broad ligament and adherent tube were very œdematous and friable. The uterine pedicle of the tube was very soft and so friable that it was cut through completely whenever a ligature or traction was applied directly to the uterine cornu itself. Another ligature was applied to the ovarian end of the tube.

The left ovary was recognized with some difficulty, and was enucleated out of a bed of dense adhesions and thick exudates, which formed part of the adventitious sac to which the ovum and its membranes had been attached. There was no recognizable embryo, only a pseudo-placental mass, which was peeled off from the interior of sac formed by the left broad ligament. The walls of the large, adventitious sac were adherent to the sacrum, rectum, and small intestine posteriorly, and pieces of membrane had to be left attached to these parts for fear of perforating the bowel while attempting to remove them.

The upper limits of the hæmatoma, or rather of the exudates that encapsulated it, were attached to the abdominal walls and bladder anteriorly, reaching as high as the umbilicus; posteriorly the promontory of the sacrum marked the upper boundary. The uterus, which was enlarged to the size of a three-months' gestation, projected in the centre of the hæmatocele, and was covered with fibrinous deposits and pseudo-membranes. The right broad ligament was very much distended, and its corresponding tube was displaced upward by an intraligamentous cyst as large as a cocoanut. This cyst also contributed to displacing the uterus upward and forward. A ligature was also applied to the right cornu of the uterus and another at the ovarian pedicle, after which the right tube was excised. The cyst in the broad ligament, which contained a clear, straw-colored fluid, was tapped, then excised freely, and packed with iodoform gauze. A great deal of bloody serum and blood oozed out of the cavity in the left broad ligament, compelling a very thorough packing with iodoform gauze on the Miculicz plan.

In the meantime the patient showed signs of great exhaustion; respiration very rapid, the pulse rose to 160, and became almost imperceptible at the wrist. Ether was stopped, ammonia was applied to the nose, and the pelvis was thoroughly flushed with hot saline solution, poured in from a pitcher, and used as a restorative as well as for the purpose of washing out fragments of clot and tissues. Simul-

taneously fifty ounces of decinormal saline solution were injected into the basilic vein. Immediate improvement followed the intravenous infusion, and the pulse fell to 112, when it was discontinued. All provisional gauze packs were now removed from the abdominal cavity, and the Mieulicz tampon, very systematically applied, was resorted to instead. The peritoneum was closed with continuous catgut suture, leaving a space for the drain. The patient was put back to bed at 4 P.M.—one and one-half hours after the abdominal section had begun. The first record after the patient reached her room shows a pulse of 130 to 140, but of fair quality. On December 25th the temperature was 101°, pulse 144, fairly good quality. Very free drainage from wound, requiring complete change of dressings. Nausea and occasional vomiting. The following rectal enema was given every four hours: Beef-juice, ℥j; whiskey, ℥ss; tr. digitalis, ♏x; decinormal saline solution, ad. ℥vj, every four hours. Hypodermatically: strychnine nitrate, gr. $\frac{1}{40}$; digitalin, $\frac{1}{100}$ gr., every four hours. Chopped ice occasionally, alternating with sips of hot water every hour, to assuage thirst.

On December 27th the temperature was 102°, pulse 128, considerable tympanites; no bowel movements, but some gas passed after repeated turpentine enemata. December 28th, calomel and soda triturates, āā gr. j., were given by mouth every hour, with small drinks of dilute champagne, iced; after ten of these had been taken a small movement of the bowels was obtained, with some relief of tympanites.

December 29th (fifth day), Mieulicz drain removed; copious enemas of turpentine repeated frequently to expel gas and relieve abdominal tension. Temperature 101°, pulse 114.

From December 29th to January 7th diarrhœa, with some tenesmus, took the place of the constipation, and the patient having as many as five and six movements daily. The stools were copious, watery, pale, and fetid. The temperature oscillated from 101° to 102½°, but the pulse showed a tendency to become slower—108–106. Respiration 28.

January 7th (thirteenth day after operation), abdominal wound doing well; all sutures had been removed and small gauze drain left in wound, but patient complains of dull pain in the right hypochondrium. Temperature 102⅖°, pulse 106. Bowel movements checked by bismuth subnitrate. During the night profuse perspiration, followed by fall of temperature to 100°. The patient now nourishes fairly well; liquid and semi-solid food retained.

From January 7th to 12th hectic fever was marked, the temperature rising to 102⅘°; pulse 120, and respirations 48, followed by profuse sweating and remissions at night. Pain in the hypochondrium continues, area of hepatic dulness increases, and it is decided that suppurative hepatitis from bowel infection exists. Diarrhœa is now checked, but stools continue fetid. In the meantime the right side of the chest and hepatic region has been kept covered with ice-bags, which apparently give relief to the pain, but do not perceptibly diminish the size of the liver, which projects about three inches below the costal arch in the right hypochondrium.

January 12th (the nineteenth day after laparotomy), aspirated (Potain's aspirator) over two pints of a watery, serous, pus, herring-sauce color; odorless. The needle was introduced in the eighth interspace and penetrated three and one-half inches before reaching pus. A specimen was preserved in culture-tubes and submitted to Dr. Pothier, pathologist of the Charity Hospital, who reported in a few days that he had been able to obtain pure cultures of a long chain coccus. In this way the streptococcal nature of the hepatic infection was established.

Hectic ceased after this aspiration; all symptoms were much relieved. Temperature fell to 99⅗°, pulse 100, respirations 26. Ice-bags continued to chest and hypochondrium.

The improvement was maintained for several days. Patient was out of her room, in a rolling-chair, and in good spirits. Nourished much better, but by January 25th (or the thirteenth day after aspiration), the temperature had gradually risen

again to 101°, pulse 100, respiration 30, and the liver area again increased in size.

On January 25th the needle of the aspirator was introduced in the ninth interspace in the anterior axilla line, and one pint of yellow, creamy pus was aspirated. The ice-bags to the right chest and hypochondrium had been kept up, with no other effect than to relieve pain. The bowel movements were controlled; abdominal wound nearly healed except at small drainage point, where a sinus remained.

February 1st (nineteenth day after first aspiration of the liver). In view of persistent temperature, with returning tendency to nocturnal sweats, decided to open liver freely. Under Schleich anæsthetic mixture (Formula No. 2, chloroform, ether and petroleum ether) three and one-half inches of the ninth rib were excised; the right pleural cul-de-sac was found obliterated and the abscess in the liver opened freely, the incision through the cortex of the liver corresponding in length to the external incision. The liver was adherent to the diaphragm. The cortex of the liver which held the abscess-cavity was nearly two inches thick. Over one pint of thick pus and slough-flakes were removed through the incision, after which the liver was firmly anchored to the intercostal spaces and the skin by deep sutures passed into the cavity of the abscess with the Reverdin needle. The abscess-cavity was swabbed with large gauze packs soaked in hydrogen peroxide, to remove loose sloughs. The cavity was then packed sytematically with large strips of iodoform gauze, over which was applied an abundant iodoform gauze and plain sterile dressing.

The temperature rose to 102⅘°, pulse 126, respiration 36, the next day, but after this steadily declined little by little until January 13th, when it became normal, with pulse 86 and respiration 20. The tampon in the liver was not removed until the thirteenth day after the evacuation of the abscess, as it had remained clean and odorless up to this time. Only the outside dressings were changed. When the tampon was removed the cavity of the liver was found clean, presenting a

healthy, granular appearance and necessitating only a comparatively small drain. The patient continued to improve, and left the sanitarium on February 28, 1898, or sixty-six days after laparotomy and twenty-eight days after hepatotomy.

Synopsis. Patient had missed menstruation six weeks before first intraperitoneal hemorrhage, which took place December 5, 1897. Second hemorrhage December 19, 1897. Laparotomy, with extirpation of ovum and tube, December 24th (or nineteen days after first rupture). January 12, 1898, first aspiration of pus from liver. January 25th (thirteen days after), second aspiration of liver. February 1st, hepatotomy. February 28th, patient left sanitarium convalescent —*i. e.*, sixty-six days after laparotomy for ectopic pregnancy, twenty-eight days after hepatotomy for abscess of the liver, and eighty-five days after first signs of intraperitoneal hemorrhage.

Conclusions. The history of the case and the anatomical conditions revealed by operation lead to the following conclusions: 1. That ectopic pregnancy reaching nearly up to the third month of gestation existed in the left Fallopian tube. 2. That some time after the second month the tube ruptured into the corresponding broad ligament, forming an intraligamentous hæmatocele. 3. That the hæmatocele continued to increase until it also ruptured into the general peritoneal cavity, where the hemorrhage became partially encysted, forming a large, intraperitoneal hæmatocle. 4. Coincidently or prior to the ectopic pregnancy, an intraligamentous cyst formed in the opposite broad ligament. 5. The value of intravenous saline infusion was demonstrated in tiding over the dangerous crisis caused by shock and hemorrhage during the laparotomy required to extirpate the sac, evacuate the blood collection, and secure the vessels. 6. Septic bowel infection following the intestinal paresis of a moderate (limited) post-operative peritonitis. 7. Septic infarct of the liver through the portal vein as a consequence. 8. Aspiration of the liver and removal of typical streptococcal pus. 9. Free hepatotomy after resection of ribs, followed by final and complete recovery.

CŒLIOTOMY IN THE TREATMENT OF THE INCARCERATED PREGNANT UTERUS WHEN IRREDUCIBLE.

By Henry D. Fry, M.D.,
Washington, D.C.

Pregnancy may occur in a retrodisplaced uterus or the organ may become displaced in the early months of pregnancy. The physiological softening of the lower segment leads, in such cases, to early and exaggerated retroflexion of the gravid womb. By rapid growth the uterus fills the posterior half of the pelvic basin, and is imprisoned by the projecting promontory of the sacrum. Continued increase of size is limited by the capacity of the true brim. Either spontaneous replacement occurs, or abortion follows, or severe and dangerous pressure-symptoms develop.

Properly applied treatment under anæsthesia will, as a rule, correct the displacement even when firmly incarcerated. In the small number of cases which resist these efforts at restoration, the production of abortion, or, more recently, vaginal hysterectomy, are the only methods of treatment recommended. Owing to the displacement of the cervix forward, and the acute angle formed at the internal os, more than usual difficulty and danger attend the artificial emptying of the uterus. Deficient drainage of the uterine cavity adds to the risk of sepsis. In the hope of saving the pregnant woman's life, vaginal hysterectomy has been employed as a last resort.

As an alternative for abortion or hysterectomy, a new method is here advocated.

The gravid uterus, displaced and irreducible by the means

that have been at our command when manipulating from below, is successfully replaced by operating from above. The abdomen is opened in the usual way, the fundus and the body of the uterus grasped by the fingers, and by manipulation directly applied in this way the displaced organ is lifted from its bed and brought into normal position.

This method was successfully carried out in a case operated upon, April 24, 1896. The patient was a colored woman aged twenty-three years, a multipara, who entered the hospital complaining of severe bearing-down pains and bladder symptoms. She passed her urine every half hour with much pain and tenesmus. Gestation was advanced between three and four months, and examination revealed a retrodisplaced uterus. All efforts to correct the position having failed, the abdomen was opened, the fundus released and brought forward and fastened by two buried silk sutures to the abdominal wall. The patient made an uneventful recovery, and left the hospital on June 10th. She passed through a normal pregnancy, and returned at its termination to be delivered after a natural labor. The puerperium was free from complications, and when finally dismissed from the institution her uterus was in normal position.

The application of cœliotomy to the treatment of this complication was original so far as the writer is concerned, and he was not aware at the time of its having been performed before.

Dr. Matthew D. Mann, of Buffalo, reported two cases to the American Gynecological Society at its meeting in Boston, May, 1898. In his first case he was uncertain of the diagnosis until after the abdomen was opened. This was in November, 1895. His second operation was at the Buffalo General Hospital on July 22, 1897. The diagnosis in that case was retroflexion of the pregnant uterus, with incarceration. After cutting through the abdominal wall the peritoneum was found drawn up by the distended bladder. This was tapped, and a large quantity of urine drawn off before the peritoneum was opened and the uterus replaced. Both

cases terminated successfully. Dr. Mann says a careful search through the literature of the past five years failed to reveal but one similar case, which was reported by Dr. Murdoch Cameron, of Glasgow, in the *British Medical Journal*, 1896, vol. xi. p. 1277.

The case was exactly similar to Dr. Mann's second case, and was operated upon in the same manner. Doubtless many times the abdomen has been opened in unsuspected cases of pregnancy to relieve retrodisplacements with or without other pathological conditions. In Dr. Mann's first case the diagnosis was in doubt between a retroflexion of the gravid uterus or a cyst behind the uterus. Dr. H. Lapthorn Smith, of Montreal, says[1] he operated upon a woman who was supposed to have an ovarian cyst, but found a retrodisplaced pregnant uterus. He brought it forward and stitched it to the abdominal wall. The woman passed through her pregnancy, and was confined at term. Dr. Malcolm McLean reported in the same discussion a case he had met with some three years before. The uterus was incarcerated in the true pelvis, and there was a tumor extending into the abdomen, which proved to be a hernia of one portion of the uterus. As soon as the organ was released it assumed its usual shape, the woman went to full term, and was delivered normally.

Dr. J. C. Da Costa reported to the section on gynecology, College of Physicians of Philadelphia, May 20, 1897, a case of retroflexed and adherent pregnant uterus with a cyst of the right ovary. After removing the cyst the adhesions were broken up, and the uterus resumed its proper position. Recovery followed, and Dr. Da Costa wrote me that she was delivered at full term of a healthy girl weighing nine and a half pounds.

Commenting on this case Dr. Da Costa says: "This operation seems to justify the ground that I have taken for some years past, that the proper way to treat a retroflexed pregnant uterus which is bound down by adhesions is to do a cœliotomy to free it."

[1] American Journal of Obstetrics, 1898, p. 279.

The object of this paper is to recommend cœliotomy and reposition of the displaced gravid womb, not only when adherent, but when incarcerated and non-adherent.

A question open for discussion is whether or not, after replacing the uterus, ventral suspension should be performed. Dr. Mann, in closing the debate excited by his paper, said: "It seemed to him that any one who had once pulled out one of those uteri from beneath the sacral promontory, and had experienced the difficulty in doing this, would hardly think it necessary to perform ventral fixation." This is true so far as any danger of immediate recurrence is concerned, but we know that these displacements invariably recur after childbirth. The woman recovers with a retrodisplaced uterus, and if conception should again take place she is liable to a recurrence of the complication. When a woman under these conditions submits to cœliotomy she is entitled to more permanent benefit than merely replacing the gravid uterus. If ventral suspension can be performed at the same time without increased risks, permanent and not temporary results are attainable.

The increased risks are the dangers of interrupting the pregnancy and producing an unfavorable influence over the confinement. Neither of these results followed the two cases reported—that of Dr. Lapthorn Smith and of the writer. Unless future work shall prove that these dangers outweigh the advantages, ventral suspension properly performed should be added to the cœliotomy and replacement of the gravid uterus.

REPORT OF A CASE OF SPLENECTOMY FOR WANDERING HYPERTROPHIED SPLEEN.

By Wyatt Heflin, M.D.,
Birmingham, Ala.

Mrs. B., blonde, aged thirty-three years, menstruated at fifteen years of age. Married at eighteen, and has had two children. Had chills and fever when thirteen years old, which lasted continuously for three years. When between fifteen and sixteen years of age the patient discovered an enlargement in the left side just below the ribs. This tumor never decreased in size.

When between eighteen and nineteen years old, the patient being then in the seventh month of gestation, upon lifting a churn filled with milk the tumor dropped as low down into the abdomen as possible. After parturition the tumor descended still lower, and remained in this part of the abdomen for four years. The patient did not suffer much pain or experience real inconvenience until two years had elapsed. Then there was considerable pain, which was always referable to the original site of the tumor, just beneath the ribs, but none in the tumor itself.

At the end of the fourth year the tumor returned to its original position, just below the ribs, and remained there for six months. The patient became pregnant again, had a chill, the tumor became dislodged, and descended as low as possible. This last descent of the tumor was accompanied by severe pain, and the patient was confined to her bed for two months, during which time she aborted.

This patient was sent to me by her family physician, Dr.

J. W. Carter, of Bessemer, Ala. On May 31, 1894, assisted by Drs. B. L. Wyman, T. L. Robertson, and J. W. Carter, I did a median line cœliotomy and extirpated the spleen. The patient had a stormy recovery, but to-day she is well. She had developed the morphine habit. When the operation was done she weighed one hundred and seven pounds. She now weighs one hundred and fifty-four pounds, gaining forty-seven pounds. I saw Mrs. B. on April 11, 1896, nearly two years after she was operated upon, and she said: "I am now perfectly free from pain, and feel better than I have felt in fifteen years." I have not seen the patient since 1896, but I hear that she continues doing well.

A REPORT OF THIRTY-FIVE CASES OF HIP-JOINT DISEASE

Treated at the Robert Garrett Hospital for Children up to April 15, 1898.

By Walter B. Platt, M.D.,
Baltimore, Md.

In making a résumé of these thirty-five cases of hip-joint disease I have grouped my inquiries under thirty-four heads and endeavored to epitomize the course and progress of the disease, whether toward a cure or unfavorably, under these heads. Some statistics and results may be of interest.

Regarding the sex of these patients, it so happens that there are eighteen males and seventeen females, showing that this disease is no respecter of sex.

The youngest of our patients was two and one-half years of age; there were two of three years, and four of four years of age. There were nine who were eight years of age.

The duration of the disease previous to entrance varied greatly, the shortest time being one month, and the longest six years.

Six to eight months is the usual time parents allow after a child has night pains and lameness in the hip before bringing it to the hospital. This is to be deplored, since experience shows that hip-joint disease, treated early, is one of the most tractable diseases in the great majority of cases.

Anyone who has had experience with hospital patients knows how difficult it is to control their treatment after leaving the institution. It is equally hard to keep their addresses,

and, once away, many disappear from observation, having moved to some other portion of the city or left the State. For that reason it has been impossible to give final results in more than a few cases. Final results are not valuable unless taken two or three years after the beginning of the disease, and a cure cannot be safely predicted until six months to a year after the subsidence of all symptoms, such as pain, fever, lameness, and sinuses.

Of these thirty-five cases there were but *three* resections, two of these done by myself. These two are still living, the first one able to act as a clerk, uses no support, not even a cane, while in the store. In the street he uses a cane. The other one walks about with a brace and a high shoe. The third patient died of shock a few hours after the operation. All of these three were desperate cases, with extensive disease of the femur and pelvis as well.

Just what cases should undergo resection and what should be left alone is a matter of judgment in every case. My opinion is that if more of the obstinate cases were resected earlier, months of suffering, suppuration and fever would be saved the patient. At the same time the most serious cases often do well with careful curetting of sinuses and early opening of abscesses.

I have never had to regret opening an abscess about the hip-joint where I could control the after-treatment, and I have repeatedly been sorry I had waited in the hope of absorption and disappearance.

In this disease the opinion of the best surgeons is different from that in cases of psoas abscess, where opening is to be deferred as long as possible. One thing of especial interest is the extreme susceptibility of hip-joint cases to contagious disease. I refer to the exanthemata. It was curious to see the hip-joint cases picked out by these diseases, and the contagious cases in the isolation ward were at one time more than one-half hip-joint cases. I refer to such as contracted disease when in the hospital, the disease being brought in by children's parents.

Of the 35 cases, 8 of these contracted contagious diseases, viz., 2 cases had diphtheria, 3 had scarlet fever, 2 had measles, and 1 contracted epidemic cerebro-spinal meningitis during the eruption of that disease in Baltimore a few years since.

Of the 35 patients, 4 are known to have died; 1 from shock soon after operation, 1 from asthenia out of the hospital, 1 from diphtheria, and 1 of cerebro-spinal meningitis out of the hospital. Only 9 had a history of trauma. In 11 the right extremity was affected; in 21 the left extremity was affected; in 23 cases out of 35 (about two-thirds of the whole number) there were no sinuses.

No.	Name.	Age.	Sex.	Date of admission.	Vol. and page.
1	J. G.	8	Male	July 25, 1888	Vol. i. p. 14
2	F. W.	7	Male	Jan. 21, 1889	p. 33
3	W. S.	10	Male	June 27, 1889	R. p. 49
4	M. L. D.	11	Female	July 30, 1889	p. 60
5	E. L.	8	Female	April 24, 1890	p. 135
6	H. C. B.	12	Male	Jan. 8, 1891	p. 200
7	C. C.	5	Female	April 16, 1891	p. 355
8	G. C.	7	Male	April 25, 1891	R. p. 369
9	A. A.	6	Female	July 7, 1891	p. 424
10	L. B.	12	Male	June 19, 1891	p. 439
11	W. S.	11	Male	June 20, 1891	pp. 367 & 443
12	M. L. B.	8	Female	Aug. 5, 1891	p. 460
13	I. E.	7	Male	Oct. 31, 1892	p. 177
14	C. P.	8	Male	Aug. 29, 1893	p. 272
15	R. A.	8	Male	July 13, 1893	Vol. iii. p. 170
16	D. R.	5	Male	Oct. 5, 1893	Vol. ii. p. 392
17	H. S.	6	Male	April 20, 1894	Vol. iv. p. 102
18	C. G.	9	Female	July 27, 1894	Vol. iii. p. 309
19	C. C.	4	Female	Aug. 7, 1894	p. 316
20	G. M.	4	Male	Oct. 4, 1894	Vol. iv. p. 142
21	B. W.	2½	Female	Oct. 9, 1894	p. 151
22	O. T.	...	Female	Nov. 19, 1894	p. 160
23	H. S.	4	Male	June 20, 1895	Vol. iii. p. 375
24	J. G.	9	Male	June 24, 1895	p. 386
25	F. S.	10	Female	July 10, 1895	Vol. iii. p. 396
26	M. E.	12	Female	Dec. 2, 1895	Vol. iv. p. 309
27	L. L.	8	Female	Dec. 11, 1895	Vol. iv. p. 315
28	R. C.	3	Male	Dec. 19, 1895	Vol. iv. p. 323
29	M. H.	6	Female	July 15, 1897	Vol. vi. p. 46
30	A. G. M.	8	Female	May 13, 1897	Vol. v. p. 335
31	V. R.	5	Female	June 2, 1897	Vol. v. p. 341
32	S. G.	3	Female	July 24, 1897	Vol. vi. p. 58
33	C. H.	8	Male	Sept. 25, 1897	Vol. vi. p. 106
34	M. R.	8	Female	Feb. 14, 1898	Vol. vi. p. 225
35	L. C.	4	Male	Feb. 24, 1898	Vol. vi. p. 237

No.	Fever on entrance.	Night pains.	Duration of disease previous to entrance.	Operations previous to entrance or other treatment.	Sinuses on entrance.	Family History.
1	Yes, present.	Not stated.	2 years.	Not stated, probably none.	"Numerous."	Not stated.
2	Not stated.	Yes.	3 months.	None.	None not'd.	" "
3	Slight.	None on entrance.	About 9 months.	Abscess opened near trochanter, no extension had been appl'd	1 sinus.	Mater. gd. parents died of pulm. tuberc.; has brother (younger) who shows signs of "scrofula."
4	Not stated.	Not stated.	Not stated.	Not stated.	Not stated.	Not stated.
5	None.	Yes.	1 year.	None.	None.	" "
6	P.M. 100°	Yes.	8 months	"	"	" "
7	P.M. 100°	Not stated.	2-3 mos. lame.	Injected (with iodoform-glycerin) at Johns Hopkins Hospital.	"	Father d. of heart dis. and paralysis; one sister. d. of marasmus (infant); no tubercular family history.
8	P.M. 100.4°	Not stated.	4 months.	None on hip. 1st metatarsal bone removed, others scraped for necrosis.	"	Not stated.
9	Present.	Yes.	7 months.	None.	"	Mother has a cough; two sisters died of pulmonary tuberculosis.
10	Little or none.	No.	8 years.	"Oper. 6 mos. ago; prob'ly abs. opened; 9 mos. in bed, with extension weight.	12 sinuses on entrance.	One brother has spinal caries.
11	Slight, 99.8°	No.	No definite history as to hip.	None for hip; plaster jacket for sp. caries.	No sinuses.	Father died of spinal dis.; mother's father and broth. had pulm. tuberculosis.
12	Not stated.	Not stated.	1 year.	Abscess opened.	1 sinus.	Parents living, 35 and 37 years of age.
13	99.6°	History of pain.	2 years.	Some oper. at Hopkins Hosp. 1 yr. ago.	"	Not stated.
14	Not stated.	None.	3 "	No hist. of operat'n or local treatment.	5 sinuses.	Mother at least living and well.
15	Not stated.	Not stated.	4 "	In hosp. in Philadelphia 4 months.	Numerous sinuses.	Negative.
16	100°	Not stated.	Unknown.	Unknown.	2 sinuses.	Unknown.
17	100.8°	Yes.	6 months.	None.	None.	"
18	99°	Yes.	1 year.	No operation; no local treatment.	"	Father has pulmonary tuberculosis.
19	100°	Yes.	5 months.	None.	"	Pater. gd. mother and pt's sister died of pulm. tuberc.
20	99°	Not stated.	6 "	None noted.	One.	Mother healthy.
21	99.8°	Not stated.	1 month.	" "	None.	Unknown; patient had diphtheria and scarlatina, February, 1884.
22	Normal.	None.	?	" "	"	Unknown.
23	Not stated.	Yes.	6 months.	" "	"	"
24	None.	No.	7 "	" "	"	Parents living and in excellent health.
25	None.	None not'd	6 years.	"Four previous operations on hip."	One.	Parents living and in good health; no brothers or sisters with tuberculosis.
26	Yes.	Yes.	Not noted.	None.	None.	"Tuberculosis in mother's family."
27	Yes.	Yes.	3 months.	"	"	No history of tuberc. in parents or grandparents.
28	Yes.	No.	No history.	None known.	"	No hist. obtained. Large swelling reg. hip-joint over trochanter and behind it.
29	Not noted.	None not'd	2 years.	None.	"	Parents healthy.
30	None.	Yes.	Abt. 8 mos.	"	"	No tuberc. in either parent.
31	Not noted.	None.	8 months.	Rest in bed and extension at Md. Gen. Hospital.	"	Tuberc. on mother's side.
32	99.6°	No.	Abt. 6 mos.	None.	"	No hist. of tuberculosis in either parent.
33	99.6°	History of night cries	10 months.	"	"	Not stated.
34	100.8°	Impossible to get hist.	5 yrs. d'ble hip dis.	Unknown.	2 right side 1 left side.	Unknown.
35	99.4°	.....	6 months.	None.	1 sinus.	Mater. grandfather has pulmonary tuberculosis.

Carious bone felt on entrance.	Visceral complications on entrance.	History of trauma.	Able to walk on entrance.	Pain or tenderness of joint on entrance.
Yes.	Not stated.	A fall as a beginning.	Not stated, prob. not.	Not stated.
No sinuses.	" "	Dates from a fall.	Not able.	Yes.
One sinus soon after entrance, yes.	Lungs not tuberculous.	A fall upon right hip Oct. 1, 1888.	Prob. not.	Not stated.
Not stated.	Not stated.	Not stated.	Not stated.	" "
None.	None noted.	Not noted.	Yes.	Yes.
"	" "	None.	Assistance.	"
None, no sinuses.	Sl. cough; urine normal.; hyp. glands in neck; lungs & viscera norm. June 9, 1891.	A fall 2 years ago.	Limps.	Not stated.
No sinuses.	Not noted.	No history.	Not stated.	Yes.
None.	Not noted as to lungs; heart and kidneys are normal.	No history of injury.	No.	"
Yes.	Heart, lungs, and kidneys are normal.	Hist. of trauma when 1 yrs. old (8 yrs. ago). 6 mos. later hip-joint disease developed.	.....	Neither pain nor tenderness on motion or light percussion.
None.	Viscera normal, but displaced by deformed thorax.	None as to hip: trauma as to tub. knee-joint.	Unable.	None.
"	Not noted.	Fall as beginning of disease.	.....	Pain on motion.
"	" "	Fall 2 years ago; pain rt. hip afterward.	.....	Yes, considerable.
"	None.	Symp. date from injury to l. hip-joint 3 yrs. ago.	?	Both pain and tenderness.
Yes.	"	Fell 3 yrs. ago; abscess 3 months afterward.	.....	None.
Not noted.	Not noted.	Not stated.	Not noted.	Not noted.
No sinuses.	None.	None noted.	Limps.	" "
" "	Beginning pulmonary tuberculosis at apex.	None stated.	"	Tenderness on pressure; no pain except night pains.
None.	None evident except urine incont. nocturn.	None.	"	Pain and tenderness.
Felt 34 dys. aft. entr'ce.	Not noted.	None noted.	?	Not noted.
None.	None, ottorrhœa both sides.	None stated.	?	Great tenderness on motion or handling.
No sinuses.	Not stated.	" "	Yes.	None.
" "	None.	" "	Not stated.	Tenderness on motion.
" "	"	No hist. of trauma.	Limps.	No.
Not stated.	"	Not stated.	Not stated.	Not stated.
No sinuses.	Loud mitral systolic murmur.	Probable trauma.	Limps.	Pain.
" "	None.	No hist. of trauma.	"	Some pain, tenderness of affected joint.
" "	None noted.	" " "		Yes.
" "	A few rales in rt. back.	" " "	Can stand.	Tenderness on motion or percussion of joint.
" "	Viscera healthy.	" " "	Limps.	No pain on motion.
" "	" "	" " "	Does not walk.	Pain, and pain on motion.
" "	" "	Fall.	"	Not much pain.
One sinus.	" "	No hist. of trauma.	?	Slightest motion of joint causes pain.
Yes, on left side.	Heart and lungs normal.	" " "	No.	Very little.
No.	Heart normal; a few bronch. rales in chest.	" " "	No.	Pain on any motion of joint.

No.	Shortening of limb on entrance.	Right or left, or both.	Thigh flexed on pelvis more or less on entrance.	Atrophy of muscles of thigh of affected limb.
1	Not stated.	Not stated.	Not stated.	Not stated.
2	" "	Right.	Yes.	Yes.
3	" "	Right hip.	"	"
4	" "	Not stated.	Not stated.	Not stated.
5	inch.	Left.	Yes.	Yes.
6	¼ inch lengthening. February 8, 1892, ¾ inch shortening.	Right.	Not stated; marked eversion present.	"
7	No shortening.	Left.	Not stated.	Yes.
8	Not stated.	"	" "	"
9	No real shortening.	"	Flexed at about 125°; limb everted, adducted.	"
10	1½ inches.	Right.	Yes, about 125°; apparent anchylosis of right hip-joint; eversion.	Not stated.
11	1½ inches.	Left.	Yes.	Yes.
12	No real shortening.	"	Some flexion.	Slight atrophy.
13	¾ inch.	Right.	Yes, pop. space 6 inches from bed with patient on back.	Not noted.
14	Apparent lengthening of affected side.	Left.	Flexion, adduction, eversion.	" "
15	1½ inches shortening.	Right.	Flexion, adduction, inversion.	Yes.
16	1½ inch shortening apparently.	Left.	Flexion, abducted.	Not noted.
17	None.	Right.	Yes.	None.
18	⅜ inch.	Left.	Slightly.	Yes.
19	⅝ inch.	First rt. later lt. hip also.	Flexion, adduction, eversion.	No.
20	1.4 c.m.	Right.	Yes.	Yes.
21	Not stated.	Left.	Not noted.	Affected thigh much swollen.
22	" "	Right.	Not stated.	Affected thigh swollen.
23	No shortening.	Left.	No flexion, but eversion.	None.
24	" "	"	Abduction and eversion.	Little or none.
25	1 inch shortening.	"	Flexion, abduction, and inversion.	Yes.
26	8 c.m.	"	Not noted.	Yes, 4½ c.m.
27	1 c.m.	"	Little or none.	Yes, 2 c.m.
28	?	Right.	Yes.	No.
29	2.5 c.m.	Left.	Flexion, abduction, eversion.	Some atrophy.
30	No shortening.	"	Not noted.	Yes.
31	" "	Right.	Adduction, eversion.	No.
32	1 c.m.	Left.	Flexion, adduction, inversion.	No.
33	No shortening.	"	Eversion.	Yes.
34	Right thigh 1 c.m. shorter than left.	Both.	Some flexion of both.	Yes, both thighs.
35	No shortening.	Left.	Flexion.	Little or none.

Treatment in Garrett Hospital.	Operation while in hospital.	Resection.
Sinuses syringed out and dressed.	None.	None.
Extension weight 2½ to 4 lbs.; rest in bed; later heavy cane and crutches.	"	"
Extension weight and pulley, 4 lbs. and more.	Sinuses opened and washed out.	Resection done (W. B. P.)
Constitutional tonic treatment; weight on affected side.	None.	None.
Wt. extension hip-joint brace, crutches, high shoe same side.	"	"
Wt. extension hip-joint brace, crutches, high shoe. Four aspirations of cold abscess of thigh, and subsequent injections with iodoform in oil or glymol; greatly improved locally and in general condition after incision, curetting, packing, etc.; Nov. 14, 1891, "general health perfect; no discharge from sinuses;" Feb. 8, 1892, sinus entirely healed.		No resect., carious trochant. and neck bone removed with curette; absc. cavity cleaned and packed.
Weight and extension 4-5 lbs.; rest in bed; later crutches.	None.	None.
Extension, weight, crutches, and stiff bandages at first; abscess opened and drained; syringed out.	Abscess opened and wiped.	Finally done (Dr. Earle, July 29, 1891); boy died 4 h. later.
Rest in bed at first with extension by weights.	None.	None.
Rest in bed; no extension; sinuses cleaned, syringed out and packed or drained daily.	"	"
Forcible straightening of left knee-joint after extension; plaster jacket to spine.	Only as to knee.	"
Rest in bed; antiseptic dressing.	None.	"
Rest in bed, with extension weights to straighten hip and knee-joints; sinus injected with iodoform oil.	"	"
Extension by weights, rest in bed, Taylor's long splint; crutches, high shoe; sinuses slit up, curetted and wiped repeatedly; syringed out with HO and carbolic solution.	Sinuses slit up curetted, wiped.	"
Weight, extension, rest in bed; sinuses slit up, curetted, and wiped.	Sinuses slit up, curetted, etc.	"
Rest in bed, weight extension, HO (?), Peru. balsam; inject sinuses.	Abscesses and sinuses opened and curetted etc. (Dr. Finney).	"
Rest in bed, extension weights.	Sinuses slit up, curetted, etc.	"
Rest in bed with extension weights.	None.	"
Rest in bed with extension by weights, later crutches, high shoe, Taylor's long splint; sinuses syringed.	Sinuses slit up, curetted, etc.	"
Rest in bed with extension; sinuses curetted, abscesses curetted, drained, etc.	Sinuses curetted and abscesses drained.	"
Rest in bed with extension.	None.	"
" " "	Cold abscess opened and curetted, etc., carious bone felt and pieces removed.	"
Rest in bed with extension.	None.	"
Rest in bed with extension, then crutches and high shoe, with Taylor's long splint.	Sinuses curetted and finally resect. head, neck, and great trochanter was done.	"
Rest in bed, extension.	None	"
Rest in bed, extension by weights; later crutches, high shoe, and Taylor's long splint.	"	"
Rest in bed, weight extension.	Cold abscess incised and curetted.	"
Rest in bed, weight extension; dilute Goulard's solution to swelling.	None.	"
Rest in bed, extension by weights.	Incision, curetting abscess and carious bone; head of femur dislocated on dors. ilii.	"
Rest in bed with weight extension.	None	"
" " " "	"	"
Rest in bed with weight extension; crutches and brace with high shoe later; now in bed for operation.	Sinuses and abscess incised and curetted.	"
Same as No. 22, except that strong tendency to recovery with retraction of sinuses.	Sinuses curetted and incised.	"
Rest in bed, extension, later crutches and double brace; sinuses injected twice daily.	Sinuses curetted and incised.	"
Rest in bed, weight extension, later crutches, brace and high shoe.	Sinuses curetted and incised.	"

No.	Perforation of acetabulum noted.	Duration of stay in hospital on first occasion.	No. of times in hospital.	Last in hospital.	Last seen.
1	Not noted.	34 days, on only occasion.	Once.	Day of discharge.	Sept. 13, 1888
2	Not noted; no sinuses.	106 days.	Twice.	Aug. 17, 1891	Aug. 17, 1891
3	No perforation.	88 "	"	April 25, 1890 Was operated on for osteomyelitis of right humerus, and necrotic bone remov'd from lining of shaft of bone.	Apr. 25, 1890
4	Not stated.	3 days, discharged againt advice; no notes taken of condition.	Once only.	Aug. 2, 1889	Aug. 2, 1889
5	None noted.	110 days.	Twice.	Nov. 10, 1890	Dec. 15, 1890
6	" "	211 "	"	Dec. 14, 1891	Feb. 8, 1892
7	None noted.	36 days.	Twice.	Aug. 24, 1891	Day of discharge.
8	Last day of life when resect. done; head of bone loose; acetabulum perforated: pubes and ischium carious.	95 "	Once.	July 29, 1898	Last date.
9	Not noted; no operation done.	9 days.	Once.	July 16, 1891	At last note.
10	Not noted.	60 "	Twice.	July 8, 1892	July 8, 1892
11	None.	29 days, 18 days on second occasion.	"	July 8, 1891	Last note.
12	Not stated.	21 days.	Once.	Aug. 26, 1891	" "
13	Not noted.	40 "	"	Dec. 10, 1892	Same date.
14	" "	87 "	Five times.	....	Aug., 1898
15	Not noted; crista ilii carious.	138 "	Once.	Nov. 28, 1893	Last date.
16	Not noted.	366 "	"	Oct. 6, 1894	" "
17	" "	123 "	At least 7.	Mar. 28, 1896?	" "
18	No sinuses.	11 d'ys (taken home by parents).	Once.	Aug. 7, 1894	" "
19	Not noted.	29 days.	Numerous times.	April 15, 1898	" "
20	Perforated.	357 "	Once.	Sept. 26, 1895	" "
21	None.	120 "	"	Feb. 6, 1895	" "
22	Not noted.	147 "	"	April 15, 1895	" "
23	No sinus.	65 "	"	Aug. 6, 1895	" "
24	Not on entrance.	16 "	Many times.	Feb. 15, 1898	April 1
25	Not noted.	6 days.	Once.	July 16, 1895	Last date.
26	None.	162 "	Six times.	Mar. 15, 1897	" "
27	None noted.	137 "	Once.	April 27, 1896	" "
28	No sinuses.	107 "	"	April 5, 1896	" "
29	Not perforated, but carious.	68 "	Three times.	Mar. 20, 1898	" "
30	No sinus.	26 "	Twice.	Nov. 5, 1897	" "
31	No sinuses.	67 days.	Once.	Aug. 8, 1897	Last date.
32	No sinus (on entrance).	85 "	Twice.	April 15, 1898 in hospital.	Apr. 15, 1898
33	Not noted.	197 days (still in hospital).	Once.	April 15, 1898 in hospital.	" " "
34	" "	In hospital since Feb. 14, 1898.	"	April 15, 1898 in hospital.	" " "
35	" "	In hospital since Feb. 24, 1898.	"	April 15, 1898 in hospital.	" " "

Last report.	Present condition, April 15, 1898.	Walks with brace.
September 13, 1888.	Unknown.	.....
As last note.	"	"
April 15, 1898, from Dr. J. McC. Scott, his physician: says he walks without any brace, crutch, or cane. Is a clerk in a store. Has still one small sinus with slight discharge.	Excellent. General health very good; has gained 35 pounds in weight; one sinus; slight discharge.	No brace used.
Same.	Unknown.	"
Recurred.	Not known.	No.
Patient goes without high shoe, and crutches only. Sinuses healed, no pain on motion of hip-joint; motion of the joint is considerable; ¾ inch shortening.	Patient died of cerebro-spinal meningitis during an epidemic of the disease in his neighborhood.	.....
As last.	Unknown.	Thomas's splint on last note.
Last date.	Patient died four hours after operation, of shock, July 29, 1891.	
.....	Unknown.	"
Same date.	"	"
" "	"	"
" "	"	"
" "	"	"
" "	August, 1898, runs about with a scarcely perceptible limp; is fat and strong.	Not in August, 1898.
" "	Unknown.	"
" "	" " " " "	....
" "	Died six weeks after removal from hospital.	....
Same date.	Unknown.	....
" "	No pain, tenderness, or symptoms.	No brace.
Died a few weeks later.	Dead.	.....
Last date.	Unknown.	....
" "	Died April 15, 1895.	"
" "	Unknown.	.....
Then.	Still has sinuses, goes about on crutches, wearing high shoe and Taylor's long splint.	Yes.
Last date.	Unknown.	....
" "	"	"
" "	"	Last re[illegible] walked without assistance, did not when left hospital.
" "	"	....
" "	"	....
" "	November 15, 1898, no pain, tenderness, or swelling; limb freely movable in every direction.	Yes.
Last date.	Unknown.	....
" "	In bed with sinuses, to be operated upon.	No.
" "	Goes about with brace, high shoe, etc.	....
" "	Goes about with brace and crutches.	....
" "	Goes about with brace and crutches; two minute sinuses open.	....

No.	Crutches only.	Walks with crutches and brace.	With crutches, high shoe, and brace.	Walks now without assistance.
1	.....	?	?	On entrance (?)
2	.....	?	?	?
3	.....	No support.	No artificial aid.	No.
4	.....	?	?	?
5	.....	.....	.....	Does now.
6	.....	.....	.....	No.
7	.....	.....	Crutches, high shoe, and Thomas's splint.	Unknown.
8	.....	.....	.....	.....
9	.....	?	?	?
10	.....	.....	.....	.....
11	.....	.....	.....	.....
12	.....	Unknown.	Unknown.	Unknown.
13	.....	Left on crutches and to have Thomas's splint and high shoe.	.....	Unknown.
14	.....	Neither, August, 1898.	.....	Yes.
15	.....	?	?	?
16	.....	?	Discharged with above.	As stated.
17	.....	?	Discharged with above at first.	?
18	.....	?	?	?
19	.....	Crutches only.	No.	As before.
20	.....	.....	.....	.....
21	.....	No.	No.	Yes, on leaving hospital
22	.....	.....	.....	.....
23	.....	No.	No.	Only slight limp; on leaving hospital advised to have a long splint immediately.
24	.....	.....	Goes about. Yes	No.
25	.....	.....	.....	Unknown.
26	Yes, March 13, 1897.	.....	.....	Unknown.
27	.....	.....	.....	Did at last report.
28	.....	.....	.....	.....
29	.....	.....	Yes	No.
30	Yes.	Crutches only, Nov. 14, 1898.	All symptoms gone Nov. 14, 1898.	Crutches only.
31	.....	.....	.....	.....
32	No.	No.	No.	No.
33	.....	.....	Yes.	With long splint, etc.
34	.....	Yes.	No.	No.
35	.....	.....	Yes.	No.

Apparent shortening.	Remarks.
?	Wretched condition on entrance.
1¼ inches.	Much improved on first discharge. Neglected for two and half years. A pronounced case on first treatment. Increase in weight.
Not stated.	Patient able to earn his living; in good health April 15, 1886, nine years after excision.
.....	Went away before resident physician had made notes or taken history.
¼ inch.	Patient finally walked without support. Recovered completely.
Apparent 1½ inches, real ¾ in.	When last heard from, a short time before death, he was in good condition and in good general health.
No shortening.	Walked on crutches. Thomas splint and high shoe when she left the hospital. No sinuses; no pain. General condition good. Died of epidemic cerebro-spinal meningitis.
.....	This patient ought to have been radically operated on and hip-joint explored at a much earlier date.
?	Removed from hospital by parents against advice.
Apparent ½ inches, real 1½ in.	This is an old anchylosed hip-joint with sinuses. Patient's general condition improved. Local condition about the same. No operation done.
Real 1½ in.	An old case of tuberculosis of spine, hip, and knee.
.....	A strong tendency to recovery, with anchylosis and a slightly flexed, adducted and everted limb.
.....	Limb flexed on pelvis. Patient disappeared from observation.
.....	Boy has steadily improved with repeated abscesses, which after curetting have finally, with one exception, healed. Patient is very fat, good color, and excellent general condition.
.....	An advanced case. Pelvis involved; head of femur on dorsum ilii; inveterate sinuses. Removed, against advice, from hospital.
?	
.....	Did remarkably well on first stay in hospital. Complete arrest of all symptoms. These returned later.
?	Taken away against advice. One of the few with any symptoms of pulmonary tuberculosis.
.....	Three and a half to three inches.
.....	Contracted scarlet fever while in hospital. Died of asthenia six weeks after removal from hospital.
.....	Whole outer aspect of thigh was swollen, indurated, and blue. This began over hip-joint. Slightest motion of joint caused pain; evidently a deep-seated abscess existed. When patient left hospital there was no limitation of motion of either joint, pain, tenderness, or limp.
.....	Patient contracted diphtheria and quickly died. The case was at first thought to be merely abscess of the thigh, but course of the disease showed it to be clearly hip-joint disease. Carious bone removed.
.....	While in hospital patient contracted scarlet fever, recovered, with desquamation in usual time, after which he went home.
2½ inches.	A very intractable case. Soon after curetting sinuses they became coated with gray gelatinous lining. They are syringed out twice daily with HO or a carbolic solution. Patient has a large and firm (amyloid) liver and pale urine containing persistent trace of albumin. Had amyloid viscera probably.
.....	In hospital but six days. Disease at a standstill. No pain, no fever.
3 c.m. real shortening.	Contracted scarlatina; typical case.
Not apparent.	Contracted typical measles while in hospital. Case has resulted apparently in a perfect cure. Child is fat, walks without limp or pain or assistance of any kind.
.....	Contracted typical measles. Left hospital perfectly well; has been running about for nine days with no perceptible limp.
Not stated.	Patient improved each time sinuses were freely opened and curetting done.
None at all.	General condition very satisfactory. No symptoms whatever.
.....	This child produces pus everywhere. Has had several times obstinate corneal ulcers which finally healed. At present needs immediate incision upon arm-hanger.
.....	Strong tendency to local recovery. Patient was attacked with diphtheria while in hospital. Recovered readily.
Both extremities.	Has improved since entrance. General health fair.
.....	General health fair. Anæmic. Sinuses retracting.

THE DIAGNOSIS OF APPENDICITIS.

By Frank T. Meriwether, M.D.,
Asheville, N. C.

That appendicitis is not so easily diagnosticated as is thought is a fact patent to those who see much abdominal work. How often are we called in late for an operation when the patient has been treated for other diseases. And it is not always to the physician's discredit, for I recall a case operated upon by me some time ago that had been diagnosticated by the great Pepper, excellent clinician that he was, as indigestion, during a previous attack, but which the adhesions and conditions found showed must have been appendicitis.

The difficulties in diagnosis also explains why certain physicians having larger practices see so few cases, while others cure large numbers by a strictly medical treatment. It is much like the obstetrician who delivers hundreds, or it may be thousands, without a perineal tear. He does not look for them in the right way, or else is not skilful enough to discover them.

There are undoubtedly many cases of appendicitis in which the diagnosis is very clear, the patient himself making the diagnosis, but many cases demand the most profound thought and judgment. I know I see cases in which it seems almost impossible to make a diagnosis with certainty, though thus far I have not operated unnecessarily. We often say with confidence that an acute, localized pain and tenderness in the right iliac fossa, accompanied with fever and a rapid pulse, after excluding ovarian disease, is very likely appendicular, but so often there is at first no localized pain, or if localized, it is not in the right fossa.

In my experience the most frequent seat of pain is at or about the umbilicus. And the temperature is very uncertain, in one case with peritonitis, it being only 98.8° at its highest, with a pulse of from 74 to 80 and good in quality. And this was a case of perforation.

Appendicitis may be confounded with almost anything, and while the members of this particular society are undoubtedly fully able to differentiate in this disease, it may be well to refresh our minds a little. The various diseases of the female sexual organs, particularly those of the right ovary, are all very likely to be confounded with appendicitis.

I believe that in the majority of cases examination of the abdomen, combined with vaginal and bimanual palpation will enable one to detect the offending organ and establish a correct diagnosis. The examination of the right fossa is the most important means of diagnosis, or if from rigidity or tenderness, a thorough examination cannot be made, the character of the tenseness of the abdominal muscles.

In my experience in ovarian or uterine trouble, if rigidity is marked, it is general—that is, both recti muscles are involved, while in appendicitis it is the right lower quadrant only. Even during the examination under anæsthesia this one-sided rigidity often remains, and I have seen cases in which the right muscle did not become relaxed until some time after the operation. Also the masses of exudate and pus from the pelvis rarely rise above the level of the anterior superior spine, while in appendicular trouble the tumor, if any, is apt to be above and rather internal, toward the umbilicus.

Ovarian Abscess. Quite a number of times ovarian abscess has been met with, in which the infection comes from the appendix, the end of which is adherent to the abscess wall.

I have met with one case in which an abnormally long and acutely flexed appendix was adherent to the ovary, in which infection occurred, the result of which was an abscess the size of a walnut. Differential diagnosis in this case was practically impossible.

As a rule, however, the history of the case, the character of the pain, vaginal and bimanual examination, the history of periodicity, and its relation to the menstrual flow, usually clears the diagnosis. The attacks are less explosive than in appendicitis, and the relation between pulse and the temperature is less distorted.

In cases of ovaritis, the character of the pain, tenderness not being so marked except upon very deep pressure, the tenderness and pain being low in the pelvis, the history and vaginal examination should suffice. Of course, attacks of appendicitis may be aggravated at the time of the menstrual crisis, as in a case of mine, the excess of blood in the pelvis causing a subacute attack of the appendicular trouble in a fibrous appendix.

In acute salpingitis there is often a marked resemblance to acute catarrhal appendicitis, but the history of possible infection, the different kind of pain, the lack of rigidity of the right rectus muscle, and the combined and vaginal examination should differentiate.

In acute salpinx the examination usually reveals the condition, but if the appendix is at fault, and peritonitis has supervened, the rigidity of the vaginal vault from inflammatory deposit and muscular rigidity make it impossible to map out anything.

Chronic pyosalpinx should be easily differentiated by its history and an examination, a confusion arising only when the tumor is very large, and if appendicular the appendix pointing southwardly, the abscess tending to burrow toward the rectum or vagina.

In extra-uterine pregnancy the history of cessation of the menses, and other signs of pregnancy, the discharge per vaginam, the character of the pain, the relation of the pulse and temperature, and the combined and vaginal examination should reveal the nature of the trouble, though in a case of mine there were no signs of pregnancy and no vaginal discharge. In this case, as in many we see, a positive diagnosis was impossible, but the necessity of operative measures being

present in the event of either diagnosis, the patient did not suffer for want of proper diagnosis.

A somewhat rare condition may be mistaken for a chronic appendicitis, but should be easily differentiated. This is a varicose condition of the broad ligament. In it the dull aching pain, always present, no history of an acute attack, no localized pain or dulness over the region of the appendix, and the absence of inflammatory symptoms should be sufficient.

In a fibroid a mistake might arise, but the history and age, with the examination, should make the diagnosis. Cases have been reported of a twisted pedicle of an ovarian cyst, in which diagnosis seemed very difficult, if not impossible; but the character of the pain is so different, the history, and examination, character and rigidity of the muscle, if any, should clear it.

In infection following an early miscarriage, the infection travelling up the right tube and causing local peritonitis, the difference in muscular rigidity, careful examination, no interference with the bowel functions, no vomiting, and the pulse and temperature, should differentiate.

Occasionally peritonitis from a small leaking pus-tube will give rise to symptoms simulating appendicitis.

In these cases the muscular rigidity, if any, is more or less general, the bowel symptoms of appendicular disease are not present, nausea and vomiting are not prominent, the history and the pulse and temperature record are not those of appendicitis.

Cancer of the ileo-cæcal region may be mistaken for appendicitis, or *vice versa*. The principal points of differentiation are, the age, history, cachexia, temperature record, and careful physical examination.

Pott's abscess should be easily differentiated, but mistakes have often occurred. In fact, I am cognizant of one. In it and nephritic and perinephritic abscess the lumbar examination will usually show the source of the tumor and pus, and, with the history of the case and the pulse and temperature records, should differentiate.

In nephritic and hepatic colic the relation of the pulse and the temperature are not so distorted as is apt to be in appendicitis, and it is more likely to be the upper rather than the lower portion of the right rectus which is rigid. The localization of the pain in the right fossa is almost certain to obtain within a few hours in appendicitis.

In nephritic colic, the tenderness over the kidney, the history, the very distinct paroxysmal character of the pain, no coating of the tongue, and no bowel symptoms, the pulse being only accelerated, as a rule, during the attack of the pain, the examination of the urine, and the palpation of the abdomen, together with the absence of temperature changes, should make up a diagnosis. In hepatic colic the history of the former gastric disturbance, the icterus, tumor, and the location of the pain and the tenderness, the temperature and pulse records, should in most cases exclude appendicitis.

Typhoid of a fulminating character may be confounded, but the usual prodromata, prolonged fever, possible infection, diarrhœa, excessively high temperature, should distinguish it. The cerebral symptoms of typhoid of this type are apt to be marked. I do not think that appendicitis should be confounded with typhoid with perforation, but I know of two cases of perforative appendicitis in which the diagnosis of typhoid perforation had been made.

The history of a necessary previous illness of two weeks before pain and the symptoms of perforation, for typhoid perforation rarely occurs before the end of or the commencement of the third week, should suffice. Even in a walking case the illness without pain would be noticed. I believe that it is frequent that a narrowing of the ileum from typhoid ulceration may produce symptoms resembling appendicitis, but the history of the manner of the recurrence not accompanied by fever, with negative palpation, and the history of typhoid fever preceding, and the pulse record, should differentiate.

Ordinary colic, from indigestion or the ingestion of some article of diet, often renders the diagnosis very obscure during the first few hours. The history of the indiscretion in diet,

tendency to diarrhœa, constipation being the rule in appendicitis, no tenderness over the appendix, examination showing no enlarged appendix, no temperature, and the rate and quality and character of the pulse, should lead one to make a proper diagnosis. The pain, however, is often of the same character, and it not infrequently is the case that the pulse and the temperature in appendicitis are normal. The following case is one of particular interest in this connection.

A negro boy, aged sixteen years, had what was supposed to be an attack of colic Monday evening, which was relieved by a small hypodermic injection of morphine. He was advised to take some salts, which he did, with the result that he felt about well the next morning. He had no fever, and his pulse was 72. He did his work, which was that of a hostler, the next day, getting around fairly well. On Wednesday night he complained again and was given another hypodermic injection. Still no fever or pulse derangement. Thursday morning he had a little tympany, and quite a little pain, it being most marked about the umbilicus. Thursday noon the pain became localized at McBurney's point. I saw the case that afternoon, at which time the pulse was 72 and the temperature 98.4°; tympany was marked, the tongue slightly coated, some tenderness over the right iliac fossa, total loss of liver dulness, bowels had moved that morning, no nausea, and the patient was fairly comfortable.

An operation made showed a large perforation with free fecal matter in the abdominal cavity, and about a pint of very foul pus free, no attempt on the part of nature having been made to wall it off. This patient had at no time shown signs of shock, and went off the table with a pulse of 80 and a temperature of 99°.

In differentiating between chronic appendicular disease and tubercular peritonitis the points are the temperature record, the history, and the lesion to be found elsewhere in tuberculosis. No mass is found in tubercular peritonitis, as would be found in chronic appendicular abscess, but the other symptoms may be very confusing. In a case I had some time ago

the history was that of recurrent appendicitis, with a temperature pointing toward pus somewhere, but at the time of operation a localized tubercular peritonitis was found, with several enlarged glands containing the tubercle bacilli. There was a sense of resistance in the right fossa, though no distinct tumor was felt.

In intestinal obstruction the temperature is more apt to be subnormal. There is no history of a previous attack, and the obstruction of the bowel is usually absolute. In one case seen the diagnosis of appendicitis was made upon the fact that after persistent endeavor the bowels were moved, though the former physicians had considered the obstruction absolute, and the operation proved the correctness of the diagnosis.

There is not apt to be a local rigidity of the rectus, and the character of the pain and vomiting and of the tumor, and the temperature record, should show in most cases the trouble to be strangulation.

VAGINAL *vs.* ABDOMINAL HYSTERECTOMY.

By B. Sherwood-Dunn, M.D.,
Boston.

In 1895 I returned from Paris after a residence of ten years there, and having seen a great deal of vaginal hysterectomy by the clamp method in my hospital service, and being its enthusiastic admirer, I praised it as an ideal operation, easy of performance, and largely devoid of the dangers attending the operation by the abdominal route.

In France it is universally accepted and generally practised, and in the hands of Prof. Gustave Richelot has shown a favorable rate of mortality, which has never been equalled by the abdominal operation.

In this country it has, here and there, won an admirer and advocate, but has failed of popularity, and for some time I was at a loss to understand why. Fuller acquaintance with the technique and results of the abdominal operation in the hands of my American colleagues has not only enlightened my mind as to the reason, but has converted me to the American operation of abdominal hysterectomy for many, and I may say the majority, of cases in which I formerly practised the vaginal route.

The evolution and perfection of the technique of abdominal hysterectomy is distinctly American, and until the publication in Paris by Prof. Paul Segond of its details, after his visit to this country, the American operation was almost unknown in France.

My change in opinion and procedure has been slow and reluctant, and results from conviction, as point by point I have been led to see the manifold advantages of an open field

for determining the conditions present, offering freedom for manipulation, and the better conditions for doing a complete operation. I first decided that cases complicated by firm adhesions were better handled through the abdomen; this left pus, cancer, and simple cases (in which I include small fibroids) for the vaginal route. Later, my natural desire for conservatism persuaded me that the simple cases, if operated through the abdomen, offered the possibility of preserving the central organ and possibly one of the appendages, which I look upon as of vital import to the well-being of women of younger years. There remained, then, only pus and cancer cases. Now I am fully satisfied that after the removal of diseased cervical tissue and the proper preparation of the uterine cavity, that the removal of a cancerous uterus by the abdominal opening offers better promise of success as it affords the opportunity to examine and remove any of the affected glands, as well as any suspected portion of the broad ligament.

Vaginal hysterectomy for me has, therefore, resolved itself into an operation of choice for dealing with pus cases, and this comprises the enlarged and soggy uterus of metritic or puerperal origin, with or without complication of the appendages, for the removal of which vaginal hysterectomy is an ideal operation.

The superior advantages offered by the vagina for natural drainage, together with the protection this route offers to the barrier which nature usually sets up between pus accumulations in the pelvis and the abdominal cavity, has held me a partisan still to the vaginal route for the treatment of extravasated pus tubes, perimetritic and pelvic abscesses. The criticism can truthfully be made that in the presence of these conditions in their worst forms the operator does an incomplete operation, in so far as he leaves undisturbed some adhesions which may later necessitate a second operation through the abdominal wall, and in some instances more or less diseased tissue, which sloughs away in the drainage and prolongs the after-treatment and convalescence; but those who have

had experience in the handling of these cases by both methods will, I feel confident, bear me out in the statement that vaginal hysterectomy is a life-saving operation, and the importance of this consideration outweighs all others in my mind. The foregoing reasons are equally cogent in persuading me that certain cases and conditions of pelvic abscess are best treated by vaginal incision and drainage, even if necessary to follow later with a radical operation. Given the choice, I believe any patient will elect two operations offering greater security to life, rather than one where the outcome is a matter of *prognosis infausta*.

The advantages claimed for vaginal hysterectomy are briefly arranged in the degree of their importance: that the operation is attended with a less percentage of mortality than the abdominal operation; that it occupies far less time in its performance with clamps, with consequently less shock to the patient; that it is practically never followed by hernia; that it offers natural drainage downward, which is important in pus cases, and equally permits of daily flushing and cleansing of the field of operation, which is an important factor in the elimination of pus and pockets, and tends to final closure without adhesions; that it avoids the abdominal scar, which is unsightly if closed with the through-and-through suture, or by interrupted superficial sutures of silkworm-gut, and is a source of annoyance to some women, and in a certain proportion of cases gives rise to hernia.

The disadvantages are: danger to the ureters, which vary in their anatomical relations; danger to the intestines and bladder; difficulty in the ready control of all oozing, which is a vitally essential point in the technique; the great pain suffered by the patient during the forty-eight hours that the clamps remain, and the time and trouble necessary to the proper daily dressing of the patient over a period of from fourteen days to six weeks, depending upon the conditions present.

The importance of the after-treatment of these cases has been generally overlooked and misunderstood by American surgeons, and as regards the ultimate recovery and favorable

results, this is as important as is the technique of the operation itself. The reason for this oversight is easily explained. The clinics are open to all without question, in Paris; but a visitor to follow the cases in the wards, and daily see the dressings, must obtain the consent of the hospital administration, which is difficult, and is seldom accorded. I have seen a host of my American colleagues present at the operations in my hospital service in Paris, but only rarely one that had sufficient interest to secure the entrance into the hospital wards, come daily at 7.30 o'clock in the morning, and go through the day's routine. They all become familiar with the technique of the operation, but very few learned the details of the after-dressing of these cases.

No case, in my opinion, can be properly douched and dressed on a bed-pan in bed. The patient should each time be placed on the operating-table in the operating-room, or dressing-room, if one be provided, and with the advantage of an open field brought into view by retractors in the hands of an assistant, with a good light and perfect asepsis, thoroughly and carefully douched with permanganate, hydrogen dioxide, or other antiseptic, and redressed with drainage of iodoform gauze, and the vagina carefully, but not too tightly, packed with the same material. It will readily be seen that this is a laborious and lengthy operation, which, so far as I am concerned, cannot be entrusted to the hands of a nurse, no matter how competent, and it must be confessed has had great influence in my relegating the operation to the saving of life only.

This brings us to the consideration of a point of cardinal import in a choice between the two methods. There is in every case of vaginal hysterectomy by clamps a sloughing of the necrosed tissue resulting from the pressure of the clamps, and if the operation is in the presence of purulent conditions, the discharge is likely to be increased; thus one cannot escape the reflection that if the mortality rates in surgery are more largely dependent upon aseptic conditions than upon any other one factor, then it is certainly necessary to exclude from

our hospitals septic cases that are a constant menace to the other inmates.

In controversion of the opinion I have heard generally expressed, I believe that vaginal hysterectomy is a more difficult operation than abdominal hysterectomy, requiring a more delicate touch and manipulation, intimate knowledge of all the hidden parts involved, which is only acquired by experience in the operation, and that the successful treatment of conditions encountered, which are never twice the same, demands greater dexterity, and what is termed surgical sense in its best definition.

Moreover, you are likely to have complications in or following this operation when least expecting them. In my last case, which was non-adherent, I had a fecal fistula resulting from rubbing of the bowel against the point of one of my forceps, causing a necrosis, which opened on the fifth day, closing, however, in due time of its own accord, as the majority of these fistulæ do.

In my radical change of opinion as to the field of usefulness of vaginal hysterectomy I find myself in the distinguished company of some of its best-known teachers and former advocates. Prof. Paul Ségond returning to France, after his late visit to this country, read a paper before the Paris Surgical Society, and published in the *Revue de Gynécologie*, entitled "Abdominal Hysterectomy for Large Fibroids, and the Superiority of the American Method Over All Others." Jacobs, of Brussels, came to this country on a missionary tour, to convert American surgeons to vaginal hysterectomy; he returned a convert to our suprapubic operation, and recently told an American surgeon visiting his clinic, that he considered it the operation of choice for the total extirpation of the uterus and its appendages.

The American operation has the great advantage of simplicity over the methods called after the names of Richelot, Doyen, and Le Bec, of Paris, and Martin, of Berlin, which operations are the best known in Europe.

The Richelot operation consists in the liberation of the

cervix from its vaginal insertions, through the abdominal opening, commencing by the dissection off of the bladder, seizing the vaginal portion of the cervix after complete liberation, and drawing it up and forward into the abdominal cavity, and then progressively cutting and tying the broad ligaments from below upward, and finally delivering the uterus and adnexa entire. The opening into the vagina and the cut borders of the broad ligaments are then approximated and closed by interrupted catgut sutures, instead of the simpler and more quickly accomplished continuous suture of the American method.

Doyen's method resembles that of Richelot, except that he commences on the posterior aspect of the cervix, opening into the posterior vaginal fornix, and draws the cervix backward and upward into the abdomen. This manœuvre is exceedingly awkward and difficult when you have a short vagina and a deep, narrow pelvis.

Le Bec's method, used chiefly for fibroids, is a compromise on the combined methods, so called, of vagina and abdomen. He commences through the abdomen by ligation of the ovarian vessels, at both the inner and outer sides of the ovary, through an opening made in the transparent portion of the broad ligament; then, after dissection off of the bladder in front, goes again through the opening in and behind the broad ligament, and carries his ligature through into the vagina and back again over the anterior surface of the broad ligament, and ligates the uterine arteries on each side. Commencing from above, he cuts the broad ligament down to his ligature on the uterine artery, both sides, amputates the uterus at this point, then dissects out the cervix, leaving sufficient tissue to form a stump on each side to prevent the slipping of his ligatures on the artery; he then draws these stumps down into the vagina by the aid of the loose ends of his ligatures, left long for this purpose, sutures the peritoneal surfaces together from the abdominal side in uncomplicated cases, shutting the stumps, with their ligatures, into the vagina.

Martin's method resembles that of Doyen, with the differ-

ence that he commences by the liberation of the uterus from above downward to and including the uterine artery, then by the vagina he forces a long pair of pointed forceps through the posterior cul-de-sac into the peritoneal cavity, enlarging this opening by lateral incisions, thus freeing the uterus from its posterior vaginal attachments. He then stitches the border of the vaginal incision to that of the peritoneum with interrupted catgut sutures, knotted on the peritoneal side, with the ends left long, which arrests the hemorrhage from the posterior and lateral recurrent arteries; he then carries his first incision around the cervix in front to the opposite side, frees the bladder, completes the anterior opening into the vagina, and delivers the uterus. He then carries the long ends of the interrupted sutures on the posterior and anterior incisions down into the vagina, closes the peritoneum with continuous catgut sutures from the abdominal side, and from the vaginal side sutures the vaginal mucosa together.

This brief description of the leading European operations is sufficient to show the greater perfection and simplicity of technique that marks the American operation, the details of which are too well known to bear repetition here before this distinguished Society. So far as my observation has gone, the leading operators seem pretty well united in their methods of procedure in the abdominal operation, excepting possibly more or less pronounced difference of opinion, still existing, as to the indications for doing a total extirpation or for leaving the cervical stump.

I believe there are a number of reasons why the cervix should be conserved in this operation:

First, in its removal you always encounter a smart hemorrhage from the recurrent lateral and posterior vaginal arteries, which to properly secure and close, in the closure of the opening into the vagina, prolongs the operation from some minutes to a half hour, according as the pelvis is deep and narrow, or the abdominal walls thick and rigid.

Second, the liberation of the vaginal insertion to the cervix demands that the operator shall keep in close proximity to,

and even encroach upon, the cervical tissue, to avoid injury to the ureters, and a slip or mishap, may cause irreparable mischief.

Third, in many women the os and cervix is the principal seat of sexual pleasure, and its removal may seriously affect the future marital relation.

Fourth, I believe the cervix is an integral part of the pelvic floor and necessary to the preservation of its normal functions.

Fifth, the opening from the peritoneal cavity into the vagina increases the chances of infection, no matter how carefully the vaginal disinfection may have been prior to the operation.

It may be claimed that the leaving of the stump endangers the peritoneum any way through the cervical canal; but I have found that if, in its amputation, the incisions are made in a decided V-shape, apex down, and the canal thoroughly sterilized, by drawing a strip of gauze through it from above downward, soaked in pure dioxide of hydrogen, or bichloride, and then the two V-shaped flaps firmly stitched together, and the peritoneal borders stitched over above, then this danger is obviated. All the steps of the operation are greatly facilitated by the Trendelenburg position.

Where hysterectomy is done for malignant disease the whole of the organ must, of course, be sacrificed; and there are cases of tubercular disease and gonorrhœal infection, where the endometrium entire is suspected, that it may be unwise to leave the cervix; also, if the liberation of extensive adhesions, or the removal of a widely adherent fibroid leaves raw, oozing surfaces, which cannot be covered and must be drained, the vaginal drainage may be more important than the conservation of the cervix; but so far, I must confess, I am strongly inclined to preserve the cervix in every instance possible.

There are a number of highly important advantages which seem to me destined to convert the partisans of vaginal hysterectomy to the abdominal route and the American operation, and which will give to this operation a fixed and permanent place in gynecic surgery; prominent among them is the opportunity to see the greater part of what you are doing,

and equally to find and determine all of the pathological conditions present, making accurate diagnosis possible, which, when determined, renders a complete operation possible; greater ease in overcoming unforeseen complications and in repairing injuries to the intestine, which are less likely, however, to occur in this operation. The danger of injury to the ureters is decidedly less, and with all of the vessels under your eye, danger from hemorrhage is lessened. Last, but not least, the stitching of the cut borders of the broad ligament and cervical stump, and the covering of them by peritoneum, protects the intestine from subsequent adhesions and lessens the danger from volvulus.

SOME OF THE COMMONER REFLEX SYMPTOMS FROM DISEASE OF THE RECTUM.

By I. L. Watkins, M.D.,
Montgomery, Ala.

The subject of reflex symptoms is so little understood that any contribution on the subject will be regarded as speculative and in no sense conclusive. That such phenomena exist is admitted by everyone; and why they are, in this age of such marvellous discoveries and undreamed-of wealth and knowledge, so little understood is strange beyond conception.

The most pronounced and annoying symptoms of this class are those due to disease of either the rectum or generative organs. These tissues are richly supplied with both cerebrospinal and sympathetic nerves. Many conditions dependent on diseases of either of these organs, heretofore regarded as reflex, are in fact not a reflex element, but due to an anatomical relation. The migration of bacteria from a continuity of tissue is well understood. The old idea that all infections were conveyed through the sympathetic glands is now known to be incorrect. In cancerous diseases we frequently find deposits of malignant growth in cellular tissue in the neighborhood where no glands exist. The bacillus coli communis, whose natural habitation is the bowel, is known frequently to infect the neighboring organs. The gonococcus not infrequently infects the mucous membrane of the bowel. These facts should not be overlooked in our investigation to determine the cause of a trouble in a given organ.

That one who devotes most of his time to gynecological

subjects should attempt to write on diseases of the rectum at first seems inconsistent and an infringement on the field of the proctologist; but in justification of this effort I shall attempt to make a report of some cases coming under my observation that belong to no small class of cases who consult gynecologists for a relief from symptoms of the pelvic organs. On examination these organs are found perfectly healthy. The question might justly be asked, Why did we not turn these cases over to a rectal surgeon? The answer to this question will be found in the statement that no one can be successful as a gynecologist without at least some knowledge of the diseases of the neighboring organs. The character of these troubles makes it desirable for them to fall in as few hands as possible.

In bringing this subject up for your consideration it is not my purpose to discuss the more common pathological conditions of the rectum, but rather to direct your attention to a line of symptoms of the pelvic organs which to a less careful observer might prove very confusing. The question may be asked whether any trouble exists in the rectum. The answer most usually would be in the negative. Notwithstanding this statement that there is nothing wrong with this organ in cases where a failure to find, on careful investigation of the other pelvic organs, a condition sufficient to account for the symptoms, the rectum should always be examined. You will very frequently be deterred from making this examination, and so long as you are you will be unable to give a positive opinion, the patient insisting all the while that the trouble is all in the uterus, ovaries, or bladder. You may be able to elicit a history of a predisposition to dysentery, the passage, at intervals, of glairy mucus, which has been attributed to obstinate constipation. This condition may have existed for a few months, or may be for several years. The sphincter is abnormally contracted and very sensitive, which will render the examination very unsatisfactory, owing to the great pain produced on passing the speculum. With the aid of a good light and the sphincter well dilated the condition to which I

ask your special attention will, in the majority of cases, be found. On either the front or back surface, or maybe both, will be found a surface, varying in size from a twenty-five cent-piece to a silver dollar, where no mucous membrane exists. It will begin about the muco-cutaneous juncture and extend up the wall of the bowel. The base of this region is pale, with irregular edges, and the depth not more than the thickness of the membrane. They exist frequently without any relation to a pile tumor or fissure. As a rule, more or less general proctitis may be found. Owing to the great similarity of the normal mucous membrane and the base of this ulcer, in a bad light it is an easy matter to overlook this trouble. Just the character of this ulcer I am unable to state, as I have not found them described in any of the works on disease of the rectum at my disposal. They are neither tuberculous nor syphilitic in character, since they so rapidly yield to local treatment. When we remember how richly supplied these tissues are with the sympathetic nerves, we can readily see that the exposure of a small area of these nerves operating through the spinal nervous system may produce a class of annoying symptoms. A bacteriological investigation might shed some light on this subject. This condition is most frequently found in people of sedentary habits who do not earn their daily bread or attend to their bodily functions.

I will select a few typical cases only to report. It will be unnecessary for me to report more, since there is such striking similarity in them all.

In September, 1895, Miss W., aged twenty-two years, from a neighboring village, applied to me with the following history: Began to menstruate at an early age, which was regular and not attended with pain. Had had the usual diseases of of childhood, but no serious illness. Was rather stout, with fairly good color. While at school was never active, being unable to indulge in the usual games with other girls. Before graduating she began to miss her periods, and developed a line of nervous symptoms, for which she was taken from school and put under treatment by the family physician.

Failing to get relief by this measure, she was placed in a surgical institute, where she had electricity, massage, and baths for several months. On the above date she applied to me with a line of symptoms very much exaggerated and very confusing. Pain in the back, left side, both legs, extending to the knees, with the sense of a heavy weight in the pelvic region while standing. She was classed as a typical neurotic subject. Examination revealed the uterus normal in size, with some cervicitis and small sensitive ovaries. After the usual preparation she was curetted and a small hemorrhoidal tumor removed. Some improvement followed, which might have been attributed to the rest in bed. She continued to suffer with insomnia and the passage of large quantities of mucus from the bowels. Owing to great sensitiveness, I was unable to treat the rectum further except under ether, which was administered and the sphincter well dilated. At this time the ulceration described above was found well developed and treatment directed to its relief. The usual application of nitrate of silver with other antiseptics, and occasional cutting through the base of the ulcer, all her symptoms improved very much. Though not entirely relieved, she was advised to return to her home for the purpose of taking a rest from treatment, which she did. Feeling that she was quite well, she decided that she would spend the summer at Mt. Eagle, from where she wrote me a letter stating that she was perfectly well and happy. Soon after this she returned to her home, and found herself growing rapidly worse. Being discouraged with her experience with me, she now applied to two distinguished members of this body, one of whom advised a removal of the ovaries, which advice she declined to accept. She has never recovered, and now regards herself an incurable invalid. In my opinion, had this woman's rectum been properly treated at an earlier date she might have been saved from all the suffering which she has endured.

CASE II.—Mrs. McC., aged about thirty-five years, nullipara, entered my sanitorium November, 1895, very anæmic and a confirmed invalid. About five years before that time

her ovaries had been removed by Dr. Batty for dysmenorrhœa. She has never been well since that time, although she did not menstruate. Complained of severe pain in her left side, weak back, and indigestion. Had very much the appearance of a cancerous subject. On examination found the generative organs in the condition usually produced by the operation which she had undergone. The vagina was patulous and the perineum was slightly lacerated. The uterus was displaced backward and there was a fair crop of hæmorrhoidal tumors. The perineum was repaired, the tumors removed, and an extensive ulceration on both anterior and posterior walls of the rectum was found. After some weeks of persuasion and argument I succeeded in getting permission to treat the rectum. Immediately the symptoms began to improve, and the patient was relieved from all of her symptoms. In my opinion, this is one of a very large number of cases where the ovaries are removed and the patient left in as bad or worse condition than before the operation. We should be very positive that these organs are the cause of the suffering of a woman before we remove them.

Case III.—Miss A., aged twenty-two years, was referred to me in July, 1898, by Dr. W. with a negative family history. Menstruation regular, had had no sickness except a slight attack of dysentery about a year ago. Since that time she had noticed some mucous discharge from the bowel. For several years she has been a great sufferer with pain in the lower part of the abdomen, and part of the time was unable to walk or stand. Recently she has vomited her meals immediately after taking them. This statement is doubtless untrue, since she is in very good flesh. This symptom was relieved by threats of severe treatment if she kept it up. As she had been sent to me to have her ovaries removed, I made a very careful examination under ether, and was unable to find any disease of these organs. Although she stated she had no trouble with the rectum, I found two very large ulcers, to which I applied pure nitric acid, which relieved her in about three weeks. She was sent home, able to walk over the entire

place, though when she came she had to be carried from her carriage to her room.

I might relate a great many more similar cases, but as my object is only to put the regular practitioner on his guard before he advises a patient that her ovaries will have to be removed, and for that reason she must consult a specialist. It is never pleasant to have to disagree with the diagnosis of the family physician, but when he is so careless as to make the error alluded to in this paper, humanity compels us to do so.

THE SURGICAL TREATMENT OF INFECTIONS OF THE UTERUS DURING THE PUERPERIUM.

By William W. Taylor, M.D.,
Memphis, Tenn.

To-day it is known that infection as it occurs in the puerperal woman is dependent either on toxins or on pathogenic germs. The two forms, then, to be recognized are putrid infection (the sapræmia of Matthews Duncan) and septicæmia. In sapræmia there is simple absorption into the circulation from some focus of decomposition, while septicæmia is due to pathogenic microbes, usually the streptococci and staphylococci, and which are generally introduced from without. In either condition the grave infections begin most frequently within the uterus. A decomposing clot of blood, a fragment of placenta, retained membranes or pent-up lochia may readily cause a putrid infection. In the case of septicæmia, if the microbes enter a wound in the vagina or cervix, the infection extends upward, where the conditions in the uterus are more favorable to microbic growth. In an infection involving the entire genital tract the micro-organisms may be confined to the mucous surfaces of the vagina and cervix, but within the uterus they have penetrated the muscles and deeper tissues. When the puerperal infection has once reached the uterus it almost always travels not by the mucous surfaces, but through the lymphatics and bloodvessels.

In the majority of cases of infection following childbirth our attention is first directed to the interior of the uterus, and in a consideration of the measures of treatment to be

instituted it will be convenient to adopt the result of Bumm's studies, which show that there are two primary forms of puerperal endometritis—putrid and septic. In putrid endometritis, as already stated, there is absorption into the circulation from some decomposing material in the uterus. The clinical symptoms are high fever, rapid pulse, and a lochia that is frothy and very offensive in odor. By exploration with the finger the interior of the uterus in putrid endometritis will be found to be rough and covered by shreds of broken-down tissue. The condition of the patient does not appear to be as serious as in the septic variety. The study of these cases has shown that there is formed beyond the necrosed decidua a so-called "granulation zone," which establishes a protective wall between the dead and living tissues and acts as a barrier to the entrance of germs. The treatment of this form of puerperal sepsis consists in the prompt removal of the offending masses with the clean finger, if they can be so reached, the placental forceps, or the large, dull curette, followed by intra-uterine irrigation and drainage by a strip of gauze passed to the fundus. In this form of endometritis the use of the sharp curette would be dangerous, as by it the protective wall which has been thrown out by nature would be destroyed and the germs would be given a ready means of penetrating to the deeper tissues.

In septic endometritis—and it is to the streptococcus infection especially to which reference is made—there is an absence of the leucocytic wall which forms between the dead and the living tissues in putrid infection. The toxins are deficient in their power to attract leucocytes, and the general system has no protection from invasion. The infection passes through the lymphatics; the septic germs travel rapidly, and the indications are for energetic and prompt treatment. In many cases the fever is slow in its onset, and is marked by remissions and exacerbations. The lochia is ordinarily odorless. Local treatment can be of benefit in this variety of infection only in cases that are seen early and while the sepsis is nearly or quite confined to the uterus. The curettage should be

thorough, and with a sharp instrument removing the entire infected mucosa. The operation should be thorough in every detail. The patient should be put under an anæsthetic, the vagina and external parts cleansed, and the cervix well dilated, if not already open. With the sharp curette the entire endometrium should be removed, free irrigation practised, the interior of the uterus mopped out with pure carbolic acid, and a single strip of gauze left in the uterus for drainage. The gauze drain should be removed at the end of about thirty hours and the uterus irrigated again, first with sterilized water and then with peroxide of hydrogen. Whenever the position of the soft and flabby uterus is unfavorable by reason of its tendency to flexion, to a free exit of its discharges, the gauze drain should be continued for several days.

I have attempted to make a slight clinical differentiation between putrid and septic endometritis. At the bedside this is often difficult to do from the clinical picture alone, and to form positive conclusions it may be necessary to make a bacteriological examination of the discharges obtained from the interior of the uterus. In the putrid form putrefractive organisms will be found, and in the septic pyogenic organisms. However, when in doubt as to the kind of infection in a given case, it would be wiser to first explore with the finger or lightly with the dull curette, and if these measures do not give evidence of débris in the wound, then proceed with the thorough treatment that has been advised for septic endometritis.

It is desired to emphasize the fact that to obtain efficient drainage it is only necessary to pass a twist of gauze to the fundus. Gauze tightly packed does not drain. Usually in these cases the uterus is flabby, and the fundus may rest in the hollow of the sacrum, and it is especially in such conditions that the light gauze drain is effective. The soft and friable condition of the uterine wall renders it easy of perforation by the curette, and to be avoided this danger should be kept prominently in mind. The question as to the use of the curette in the treatment of the acute infections of the

uterus has been much discussed, and whenever mentioned in medical societies always calls forth much difference of opinion. It cannot be seen how the finger and dull curette, lightly used in putrid endometritis, can do harm. There is no disturbance of the protective wall that nature has formed, but a simple removal of the offending masses. In the septic variety it is to be remembered that no infiltration area is found, and the sharp curette, if not used sufficiently early, when the infection is nearly or quite confined to the uterus, cannot add to the danger of the situation. The lymphatics are already open, and if we are guided by Bumm's observations the sharp curette cannot break down a barrier which does not exist. The prompt removal of the entire infected mucous membrane and the mopping out of the uterine cavity with pure carbolic acid will remove considerable septic material and render the interior of the uterus a less favorable culture-ground for the propagation of organisms.

It is well known that in some cases of septic infection of the uterus all methods of treatment directed to stop or retard the progress of the infection are of no avail. In spite of all efforts, the infection extends through the lymphatic and blood-vessels to distant parts, and the metritis then becomes relatively insignificant. Other pelvic organs become the seat of infection, and as a result there may be suppuration of the ovaries, tubes, and pelvic connective tissue, or it may eventuate in a diffuse suppurative peritonitis. A parametric abscess should be opened as soon as fluctuation appears. Ovarian and tubal abscesses, if high up, should be dealt with by abdominal section, but if low down in the pelvis they may be reached by vaginal incision. It is perhaps well here to sound a note of warning against a too hasty and indiscriminate performance of operations for pelvic inflammations occurring in the puerperal woman. During the past year a young woman came under my care after eight weeks in bed following a confinement. She had a mild fever, the pelvis was choked, intraperitoneal exudates surrounded the tubes and ovaries, and over the abdomen there was a line of indu-

ration reaching half way to the umbilicus. With absolute rest, mild purgation, and heat and blisters, complete absorption took place and a full restoration of all the organs to their normal functions.

The question as to when hysterectomy is justifiable in puerperal sepsis is difficult to solve. It is undoubtedly the proper procedure in some cases, but how are suitable cases to be selected? With our present knowledge as to diagnosis in such conditions we are as liable to operate too early or unnecessarily as too late. Hence it is not thought that the operation will at present be very generally adopted.

A CASE OF TETANUS TREATED WITH ANTITOXIN.

By Hermann B. Gessner, M.D.,
New Orleans, La.

At this time, when the serum-therapy of disease is receiving close attention, it seems well to report all cases in which a test of this mode of treatment has been made. Tetanus is not the least important of the diseases in which antitoxic serum is employed as a curative means. Again, it appears especially desirable to report and consider carefully the fatal cases, knowing as we do the readiness with which good results are reported, while practitioners are not so apt to report the unsuccessful application of any therapeutic means. For these reasons the following case is reported as concisely as the bringing out of the necessary points will permit:

Victor C., aged seven years, a compactly built boy, of Creole extraction, presented the first symptoms of the disease on the night of the 15th of April, 1897, when he woke up with a painful stiffness of the muscles. Two weeks previously he had got a splinter into the plantar surface of the right foot; a small sinus persisted at the site from which the entire splinter was thought to have been removed.

When first seen, on the evening of the 16th, the boy could separate his teeth sufficiently to permit the insertion of the index finger; his head was strongly extended, his back markedly arched; the abdominal muscles were a little rigid. Liquid nourishment (milk, broths) was ordered, and perfect quiet enjoined; chloral hydrate, gr. v., and potassium bromide, gr. x., were directed to be given every hour until he should fall asleep.

April 17th, A.M. Temperature 98.6° F. in rectum. Clonic convulsions had occurred during the night, with biting of the tongue. The plantar sinus was laid open, chloroform being administered. A splinter was removed, the site well cleansed, and an iodoform gauze pack introduced. Twenty c.c. of the antitetanic serum of the Pasteur Institute, obtained from Dr. P. E. Archinard, demonstrator of microscopy and bacteriology in Tulane University, of Louisiana, were injected hypodermatically, ten in each flank. Chloral and bromide were given every two hours.

P.M. Pulse 126. The boy had had several clonic convulsions, with much pain. He was more rigid. The head and back formed a marked curve. The teeth could be separated to the extent of one-quarter inch. The bowels moved once on this day.

April 18th, A.M. Temperature 101° F, pulse 106, respiration 26. The patient was less rigid. Marked opisthotonos was observed only during the clonic contractions, which were not frequent, but could be brought on by any irritation, such as a touch, even the attempt to swallow a small dose of medicine. Ten c.c. of serum were given hypodermatically after the administration of a few whiffs of chloroform.

P.M. Temperature 102.4° F. Improvement was manifest. Another dose of 10 c.c. of antitetanic serum was given under chloroform anæsthesia. Two bowel movements occurred during the twenty-four hours.

April 19th, A.M. Pulse 168, respirations 56. The boy was swallowing a little better, but was very weak. Liquid peptonoids were given. Frequent, slight, general muscular contractions were observed. The bowels moved twice. Death supervened in the afternoon, without any apparent change in the symptoms.

Comment: Death followed the administration of the last dose of serum, given at a time when the patient was improving. On the principle, *post hoc, ergo propter hoc*, we might attribute the fatal issue to the last dose. While we cannot deny the possibility of giving an excess of the serum, yet,

considering the fact that the instructions accompanying it tell us to give an adult as much as 50 to 100 c.c. in one or two doses, it is not probable that 40 c.c., given in the course of thirty-six hours, caused the exitus lethalis in this case. Rather is the death to be attributed to exhaustion—a great danger in all tetanic patients; in the present instance unsatisfactory feeding and lack of the absolute quiet enjoined no doubt permitted dissipation of the boy's vital energy.

REPORT OF A CASE OF FIBROID TUMOR OF THE ABDOMINAL WALL, WITH REMARKS.

By C. Jeff. Miller, M.D.,
New Orleans, La.

A married woman, aged twenty-one years, of good family and personal history, consulted Dr. E. S. Lewis to ascertain the nature of a tumor occupying the lower part of the right lumbar and the upper part of the right inguinal region, which had been steadily increasing in size for two years. It was first recognized as a small, hard, painless nodule, exactly over McBurney's point, and made its appearance about two weeks after the termination of her only pregnancy. Then for several months it grew rapidly, but gave no inconvenience, as there was absolutely no pain. Three months before she consulted Dr. Lewis, sharp pains, though not of a severe type, commenced in the growth, and continued at intervals up to the time of operation. There had been no appreciable increase in the size of the growth for four months prior to the appearance of the pain, but after that time its growth was steady. The tumor occupied parts of the right lumbar and inguinal regions, was ovoidal in shape, about eight inches long, five inches broad, quite hard, painless, and particularly prominent. Manipulation of the tumor imparted a feeling of strong attachments under it, and because of the close proximity to the iliac bone it was at first thought that its origin was in the iliac fossa. Vaginal examination, however, showed that the tumor occupied a position above the pelvic borders and not connected with any pelvic viscera. The inner border of the growth extended to

the outer border of the right rectus muscle. Its removal was not attended with any difficulty. After an incision in the line of the axis (which was parallel to the median line) the growth was easily and quickly enucleated, except along its outer border, where the abdominal muscles seemed to lose themselves in the substance of the fibroid. The growth was encapsulated, but seemed to be intimately connected with the transversalis and internal oblique muscles along its outer edge. Fibres of the external oblique passed over it, but the muscle itself seemed to have been practically removed by the pressure. The peritoneum was not opened, but was laid bare over an area fully six inches square. After enucleation of the tumor the ends of the muscles and fascia were united with buried catgut and the skin closed with silk sutures. The wound healed readily, and recovery was uneventful.

It is not generally realized that the abdominal walls are particularly free from neoplasms. When it is known that fibromata are the growths most frequently found affecting the abdominal wall, and that they are of exceedingly rare occurrence, some idea of the rarity of neoplastic changes may be formed. T. F. Richardson,[1] in an interesting thesis, states that Leon Labbé saw only ten cases in a period of twenty years in the hospitals of Paris, and that a search through the records of the past five years of the Charity Hospital of New Orleans failed to reveal a single case. The cause of these fibromata is as ill-defined as like growths of other regions of the body. Trauma, however, seems to bear a more direct relation to these cases than those of other regions, for they occur almost exclusively in women, and are usually situated in the lumbar and inguinal regions, along the rectus muscle, where the greatest strain is exerted during pregnancy and parturition. The most peculiar phenomena connected with the development of these fibromata is their intimate relation to pregnancy. In the majority of all cases reported the tumor

[1] The graduation thesis of Dr. T. F. Richardson of New Orleans, La., which contains the report of two cases of fibroid tumors of the abdominal wall and a review of the literature on the subject, from which I obtained valuable information.

was first recognized as a painless nodule, which made its appearance within a few weeks after parturition, and grew rapidly. Owing to this fact it may be safely inferred that injury to the abdominal muscles, by reason of the constant tension and laceration during pregnancy and parturition, is the most exciting cause. The history of the majority of cases is strikingly similar. The tumor makes its appearance soon after parturition, and because of the absence of pain is usually discovered accidentally. Growth in the beginning is very slow, but after a few months or a year development may be very rapid. The histology of these fibromata affords an interesting study. Pathologists have found that a marked difference in structure differentiates them from the fibrous growths of other regions. The essential difference consists of the arrangement of the fibrous tissue into bundles. It is of interest to note also that a capsule is found enclosing the tumor in the majority of cases. The tendency to sarcomatous degeneration is well marked—a point of practical importance in deciding in favor of early surgical intervention. The anatomical site of the tumor influences considerably the ease with which a diagnosis can be made. In many cases the bulk of the growth projects toward the abdominal cavity, and in such instances it is almost impossible to make a positive diagnosis, owing to the close resemblance it bears to intra-abdominal growths. It can easily be seen how readily a tumor occupying the abdominal cavity which has become adhered to the abdominal parietes could be mistaken for growths in the walls. Tumors of the urachus, because of their intimate relation to the abdominal walls, might be confounded with these fibromata. If it is remembered, however, that fibroids never develop in the median line, and very rarely cross it, a mistake could hardly be made. If the growth of the tumor takes place in an outward direction a diagnosis is readily made by virtue of its consistency, marked prominence, and mobility.

It is hardly necessary to dwell upon the treatment of such growths. The tendency to malignant degeneration makes it

encumbent upon the surgeon to urge immediate surgical intervention. Owing to the position of the tumor it is particularly liable to traumatism, and also subjected to constant pressure by the form of dress common among women. Such influences are prone to excite inflammatory changes, which may give rise to intimate adhesions between the growth and the muscles, fascia, and peritoneum. The majority of these tumors are encapsulated, unless inflammatory changes have occurred —a fact which should always be remembered and urged in favor of early operation. Hernia very frequently develops after the removal of abdominal fibromata, owing to the extensive involvement of fascia and muscular tissue in the growths. Hence it is necessary to preserve all healthy tissue and avoid opening the peritoneum, if possible. Unless inflammatory changes have occurred it is seldom necessary to open the peritoneum. In the majority of cases reported the tumor was easily enucleated, leaving bare an area of peritoneum corresponding to the size of the fibromata. In order to prevent serious disturbance to the blood-supply of this area of denuded peritoneum it may be necessary in some cases to attach it to the abdominal walls.

THE TREATMENT OF SPRAINS BY STRAPPING WITH RUBBER PLASTER.

By E. D. Fenner,
New Orleans, La.

Early in 1895 there appeared in the *New York Medical Journal* an article describing and advocating a new method of treating sprains, particularly of the ankle, but applicable to other joints as well. This treatment, thus brought prominently before the profession by Dr. V. P. Gibney (but originated by another surgeon), promised a great improvement over older methods. A bad sprain is a serious injury. It is commonly attended with a good deal of suffering; not seldom it results in permanent impairment of the joint; and when treated by immobilization with plaster-of-Paris or liquid glass it involves a period of semi-invalidism and crutch-life varying from two to six weeks.

The method advocated by Dr. Gibney consists in thoroughly supporting the joint structures by means of strips of rubber adhesive plaster, overlapping each other and applied in a definite manner so as to obtain accurate splinting without interfering with motion. The essential principle of the old methods was to obtain rest by fixation of the joint; the aim of this new method is to obtain rest by support without interfering with the motion of the joint. Under this regime, said Dr. Gibney, pain was relieved, swelling subsided, stiffness of the joint was prevented, and yet the patient did not lose a day from his business or his pleasure, but could walk freely and easily from the moment the dressing was applied.

Such a prognosis marks a great advance in the manage-

ment of sprains, and, sustained by experience, should induce surgeons everywhere to prefer this method to others. I am convinced that it is not, despite the high authority of its sponsor, as widely employed as its merit deserves; and, since no principle in surgical therapeutics is ever established except by the accumulation of evidence in its favor, I have ventured to record my own experience in this paper.

Shortly after reading Dr. Gibney's article I was called to see a railroad track foreman who had sustained a very severe sprain of his ankle two weeks before. His occupation involved a great deal of walking, and he absolutely refused to be confined to the house. At the time of his injury he had applied to the Charity Hospital, and the foot was put up in a liquid glass bandage. He hobbled in this cast at his work, the ankle getting every day more painful and swollen, till at last he sent for me. I found him suffering acutely and unable to put his foot to the ground. The whole foot and leg nearly to the knee were tender and badly swollen. Large ecchymoses were present on both ankle and leg, and a great deal of inflammatory exudate had been poured out into the tissues. Evidently the sprain involved both the ankle and the tarsal joints. Since he persisted that he must go about at his work, this was evidently my opportunity to try the new method. I explained it to him, and he agreed to let me use it. I at once applied the complete dressing for tarsus and ankle. The next morning he went out to his work and walked some, but still with considerable pain, using a stick to help him. Every day, however, he grew better and made more use of the limb. He declared the dressing had helped him a great deal, and was well satisfied with it. In a week I reapplied the strapping, finding the limb much less swollen, a good deal of the inflammatory induration having disappeared in spite of his free use of the joint. By this time he was walking about with very little trouble. In ten days the strapping required to be renewed, and in two weeks more I was able to discharge him, cured, with a thoroughly competent joint. From former experience I am convinced that confinement in a

plaster-of-Paris cast would have resulted in a stiff joint in this case.

Case II. was a young man who had slipped, sustaining a severe sprain of the external ligaments of the ankle. I was called to see him the day after the injury, and found him suffering acutely. The ankle was swollen, tender, and he could not bear any weight upon it. He laughed at my proposition to let him walk immediately after applying the dressing, and I had some difficulty in persuading him to step out after I had gotten it on. However, he soon found he could walk without pain, and in an hour went down to his business, which was that of bookkeeper. He never lost another day, suffered no pain or limping, and in eight days engaged in a game of football. On the fourteenth day I removed the strips and found his ankle perfectly well.

Case III. was a young man who slipped on his steps, sustaining the usual sprain of the outer side of the ankle-joint. There were present pain, swelling, and inability to bear weight on the limb. I applied the plaster strips in the usual way, and in an hour he met me on the street. He was walking, with hardly any limp and without pain. In another day he had learned to walk rhythmically, and in ten days was discharged entirely well.

Case IV. was myself. I wrenched my left knee, injuring the structures on the inner side of the joint. There were considerable pain and tenderness, and I could not walk at all. I went to my office on crutches, with a posterior splint on the knee. There I applied strips of plaster up and down the whole internal and anterior aspects of the knee-joint. Although the strips interfered with the extensive arc of motion necessary to easy walking, they relieved the pain, and I was able to get about with only a slight limp, and in five days was well.

Case V.—A gentleman, aged about sixty years, sustained an unusually severe sprain by a fall from a bicycle. All the usual symptoms of sprain were present, with the addition of extensive ecchymoses all about the ankle and nearly up to

the knee. I did not apply the straps until the next day, when the limb was very tender and painful.

This case gave me more trouble than any I have treated, as it was probably an unusually severe injury. For two or three weeks there continued to be some pain and tenderness in walking, but the strapping did its work and enabled the patient to be at liberty all the time. Gradually the pain subsided, and in about six weeks he was able to discard the dressing, which had been renewed several times. The functions of the joint were found to be fully restored.

Case VI.—A young lady, the wife of a physician, sprained her ankle at tennis. When I saw her she was in bed, and presented the usual symptoms of sprain of the outer side of the ankle. Fortified by my experience, I assured her that she would be able to walk without pain or limp as soon as I had applied the straps. Her husband had provided the plaster, which, upon examination, proved to be old and of very poor adhesive quality. I expressed the opinion that it would not hold, but there being no other at hand we decided to try it. After the dressing was on I got her to try to walk, but she complained bitterly of pain when she did so. The next day, after suffering all night, she was still unable to stand on the limb. Her husband then removed the dressing and found that the old plaster had slipped and gave no support. He got some fresh plaster and applied a new dressing, as he had seen me do. The result was all that I had promised. She was able to walk without pain, and in a few hours was out of the house, to which she had been confined ever since she was hurt.

I have treated a number of other cases by this method with unvarying satisfaction, and a number of my friends have employed it at my suggestion, with equally favorable results. I therefore have no hesitation in declaring that it fulfils all the claims made for it by Dr. Gibney, which are :

1. It offers a mode of treating sprains without confinement or the use of crutches, permitting the patient to walk freely, without pain or limping, from the very day of the injury.

2. It results in a more speedy cure, without any danger of a stiff joint.

3. Suitably modified, it is applicable to other joints than the ankle.

In applying this treatment it is only necessary to follow the directions given by Dr. Gibney, and make certain that the foot is at a right angle to the leg. If the toes are allowed to point downward the patient cannot walk without limping, but if this precaution is observed it requires only a little deliberate effort to establish a rhythmical gait.

THE TREATMENT OF CANCER OF THE UTERUS.[1]

Dr. Lewis S. McMurtry, of Louisville, Ky., read a paper with the above title. He said that the treatment of uterine cancer had not shared proportionately in the great advance of modern pelvic surgery. While other diseases which were long the opprobria of medical and surgical science and art had been made amenable to surgical treatment, the treatment of cancer of the uterus was practically where it was twenty years ago. Cancer of the uterus was a very common disease. Women were more subject to cancer than men, and in quite one-third of all cases of cancer in women the uterus was the seat of the disease. The disease occurred, as a rule, between the ages of thirty and fifty, attaining its maximum prevalence at the menopause. It was rare in unmarried and sterile women, and was most common with mothers of large families. Race and environment have much to do with its development. It has been the experience of the essayist that the disease is proportionately rare in the negro race. From a careful statistical study Billings declares that cancer is slowly but steadily on the increase, and that its greatest prevalence is in nations which have attained the highest state of civilization. In 1893 London alone lost 3412 of her population from this disease, a percentage of 3.73 of the total death-rate for the year. Cancer of the corpus uteri is rare in comparison with the common exhibition of the disease in the cervix, but not so uncommon as was formerly understood. Cancer of the cervix originates

[1] Author failed to furnish paper in time for Transactions.

(1) in the squamous epithelium of the vaginal portion of the cervix; (2) in the cylindrical epithelium of the cervical mucosa, and (3) in the epithelial lining of the cervical glands. Cancer of the body of the uterus originates in the epithelial structures of the endometrium.

The treatment of uterine cancer consists in a variety of operative procedures leading up to the most recent operation of combined abdominal and vaginal extirpation. The names of Verneuil, Carl Braun, Schröder, Pawlik, Koeberlé, and Bryne are associated with high amputation of the cervix with écraseur, cautery, and knife. High amputation, as practised by Schröder, attained the greatest favor and maintained its position over hysterectomy until 1886. Prior to this time hysterectomy had such a high mortality (15 per cent.) that high amputation deserved preference. In 1886 the operation of total vaginal extirpation was revived by Martin, Leopold, and Olshausen. Since that time this operation has been very generally adopted, and is to-day the accepted treatment for the radical cure of cancer limited to the uterus itself. With the modern perfected technique the mortality of this operation is reduced to about 4 per cent.

The doctor referred to the statistics of vaginal hysterectomy as given by Pozzi in the third edition of his *Treatise on Gynecology*, an analysis of which does not strengthen or inspire confidence in the ultimate results of this procedure. He said that claims are being made for the permanent cure of uterine cancer by hysterectomy which could not be realized. Of all the cases of uterine cancer which apply for treatment only a small proportion are within the scope of a clean extirpation by vaginal hysterectomy. The large number of cases in which the disease recurs at the site of operation within a few weeks demonstrates that the operation is in most cases simply a resection, leaving behind sufficient disease for continued activity. His personal experience with this operation has been discouraging. Vaginal hysterectomy for cancer has never been a favored operation with him. During the past year he has done the operation in five cases, which were

selected as most favorable for permanent cure. In all the disease was discovered early, and, so far as macroscopic evidence could show, it was limited to the uterus itself. The organ was normally mobile. Of these five cases treated by vaginal hysterectomy two had recurrence, one in the bladder, the other in the vaginal fornix at the cicatrix, within five months after operation. These were selected cases in which the disease was early recognized; the patients were under fifty years of age, and well nourished. The operation was done with a view of going far beyond the region of probable infiltration and removing the appendages with the uterus. Based on his own previous experience and that of other operators, it is doubtful if one of the three remaining cases will be living at the end of three years from the time of operation.

The histological structure of the uterus and adjacent structures is exceptionally favorable for disseminating this disease. The rich lymphatic distribution here is an active means of infection, but the studies of Cullen show that the activity of lymphatic invasion has been exaggerated and that the common mode of infection is along continuous structures. Extension is most rapid around the vaginal vault, forward and downward under the bladder, and in the base of the broad ligaments. The common invasion of the vagina by implantation about the cancerous cervix has suggested to Werder the method he has practised of total excision of the uterus and vagina by suprapubic operation.

In conclusion, Dr. McMurtry considered in detail the choice of operation for the several classes of cases of carcinoma of the uterus which are presented to the surgeon for treatment. For advanced cases, where the entire field of evident invasion cannot be removed, he advocated thorough curettage, scraping away necrosed tissue, emptying obstructed pus accumulations, washing out débris, and establishing drainage, and antisepsis. Such local treatment will reduce septic intoxication, prolong life, and promote comfort. All operations for radical cure should be limited to cases in which the disease is

recognized sufficiently early for thorough removal of invaded structures. This will be best accomplished in the majority of cases by abdominal section and removal of the uterus from above, including liberal portions of adjacent structures, especially the upper portion of the vagina, where implantation from the cervix is so often found. While liberal excision of suspicious areas of tissue should be done it will rarely be found necessary to remove the subperitoneal lymphatic glands, since their enlargement has often been found inflammatory in character instead of cancerous. The field of vaginal hysterectomy should be limited to the few cases of early diagnosis in which operation can be done before deep extension of the disease. Efforts for prophylaxis should be most diligent and should be of universal application. All ulcerative and cicatricial lacerations of the cervix should be repaired as a prophylactic measure.

DISCUSSION.

Dr. William L. Rodman, of Louisville, Ky.—Mr. President: I hope Dr. McMurtry will pardon me for rising early in the discussion to ask for information. He made a statement as to the ratio of prevalence of cancer of the uterus in the black and white races, which is at variance with my experience, and recognizing this audience as one of the very best to obtain general information on this subject, and having written to many of the members within the last year for information along these lines, I would ask those who speak upon the subject to give their experience as to the relative frequency of cancer in the black and white races. I am rather surprised at the statement as to the infrequency of it in the negro. According to Billings' last census statistics (the eleventh), it is more common at all ages in the black than in the white race. This is the experience of Matas, who has carefully examined the records of the Charity Hospital in New Orleans. It has also been the result of my examinations of all deaths recorded by the Health Department of Louisville for the past thirty years, in both the white and black races—a larger proportion of deaths occurring in the negro population.

Dr. Ernest S. Lewis, of New Orleans, La.—The last speaker having alluded to the Charity Hospital, with which I have been long connected, I would say in reply that in my experience there is no immunity among the blacks to uterine cancer. My clinical assistant, Dr. J. C. Miller, has a record of over fifty case in the past two years in the Charity Hospital. I think, on the contrary, owing to their uncleanly habits, their mode of life, etc., they are particularly prone to cancer of the uterus.

With regard to the results of operations for cancer, I indorse what Dr. McMurtry has said. Even when performed early there is a return of the disease in a large majority of the cases, and when in an advanced state almost invariably a recurrence. I have no experience with the abdominal operation, but believe it will be found equally as unsatisfactory as vaginal extirpation.

Dr. Virgil O. Hardon, of Atlanta, Ga.—In reply to the question of Dr. Rodman, I am in a position to confirm his conclusion with regard to the matter of which he inquired. I am connected with the Grady Hospital in Atlanta. We have colored wards and white wards for women, and both are about equally filled all the time. The difference in the number of women in the white ward and the number in the colored ward varies very little. While I am not prepared to give any statistics bearing upon this point, yet it has been my observation during my connection with this hospital since it was opened (a period of seven years), that cancer of the uterus, at least in the class of patients we get in hospital practice, is more frequent in negro women than in white women, and I am as sure as I can be of anything which I cannot prove by citing figures, that the proportion is considerably larger in the Grady Hospital. Therefore, I am very much surprised to hear Dr. McMurtry's views upon that point.

I have been led by my experience in the treatment of cancer of the uterus to the same conclusion that Dr. McMurtry has reached, except that I have gone further than he has: I have operated for cancer of the womb by vaginal extirpation, by the abdominal method, and by the combined method, and I never yet have operated upon a case where recurrence of the disease did not take place sooner or later, and for that reason I have lost all confidence in the operation as a means of effecting a permanent cure. I have abandoned it. I have no doubt on theo-

retical grounds that in cases seen sufficiently early a permanent cure might be effected by operative measures; but basing my practice upon my own experience, I have been led to abandon the operation as a means of permanent cure. That brings me to the conclusion that the last speaker expressed when he prophesied that the profession would sooner or later conclude that extirpation of the womb for cancer is to be undertaken simply as a palliative measure. But, Mr. President, if the treatment of uterine cancer is to be only palliative, it seems to me it is too serious an operation for us to undertake. I could not consistently perform a major operation upon a patient simply for the purpose of palliating the disease, with the hope of simply prolonging her life for a short time, for recurrence takes place in a few weeks or a few months. There are other palliative measures which, in my estimation and experience, will accomplish more than extirpation of the womb, and these consist in measures for preventing septic infection, from which the majority of patients die when they die from cancer of the uterus. If we can keep the uterus clean; if we can remove the decomposing tissue from the broken-down, ulcerative surfaces, we can prevent septic infection; we can keep the patient going. I find some striking instances in patients who have fallen into a hectic condition, with rapid pulse, high temperature, great loss of strength and emaciation, where a thorough curetting and the constant application of antiseptics to the ulcerated surfaces have kept them alive longer than many who are kept alive by total extirpation of the womb. When we consider the anatomical structure of the uterus, particularly the extensive network of lymphatics which permeates the uterus, which extends out like a net into the broad ligaments far beyond the point where we can reach with the knife, we can understand how almost immediately those lymphatics respond to any diseased condition in the uterus. We see it not only in cancer, but in a great many other conditions, and I cannot understand how any man can hope to perform a radical operation with a view of permanent cure unless he totally disregards the rules of operation which apply to cancer in all other parts of the body. If there be cancer of the breast, even if we see it in its earliest stages, when apparently the lymphatics are but slightly involved, the method of procedure is to do a Halstead operation to remove all the cancerous process, and not

only it, but all the lymphatics which are in any way involved, the axilla and supraclavicular space, and all the regions which can possibly have any lymphatic connection with the seat of the disease. We cannot hope to do that in the case of a cancerous uterus, because it is an absolute anatomical impossibility, and this anatomical impossibility, theoretical as it may seem, is borne out in my experience, and I think in the experience of nearly all men at the present day, by the clinical results. For that reason, I believe total extirpation of the uterus in the cases as we see them—that is to say, in patients who come to us after the lymphatics of the pelvis have become affected by the disease—is far from being a rational procedure.

Dr. Howard A. Kelly, of Baltimore, Md.—I am astounded at the tone the discussion has taken, because I have had many cases of cancer of the uterus that are still living years after the operation for removal of the neoplasm. I believe patients with cancer of the uterus ought to be operated upon by radical means, removing the uterus by the vagina, or by the abdomen, according to the training of the operator.

I have a very elaborate series of studies on this subject, which will appear in the course of the coming six months, by Dr. Cullen, with drawings which show conclusively that the disease begins at some one focus, whether in the body or in the cervix, and spreads from that focus. Now, if we can catch the disease before it has gone too far out from this focus we can cure the patient by operation. There is no question about it. I thought a year and a half or two years ago that we had made a great discovery in the analogy of cancer of the uterus to cancer of the breast, and that the great step in the immediate future was to be the enucleation of the uterus with the pelvic glands. I opened the abdomen a great many times, made very wide dissection of the uterus and surrounding tissue, and, with great pains and risk to the patient, dissected from the crotch of the common iliac vein and the external iliac artery the enlarged, hardened glands. If I remember rightly, none of those glands were enlarged very much, if at all, by inflammatory-products, and there were no cancerous elements in the glands that would have been considered a source of danger to the patient if left. Therefore, the analogy of cancer of the uterus to cancer of the breast fails. The disease extends directly out, as a rule, from the original

focus; it may be implanted up into the body of the uterus, and we find a surprisingly large number of cases where the cancer begins in the cervix, and where there is also incipient disease in the uterine body, showing how unsafe it is to amputate the cervix. We also have had a number of cases in which there were implantations of the disease upon the vagina. In one of my cases I had to deal with a vaginal carcinoma which was very easily enucleated. Two years later, however, the patient came back, and we found that she had extensive adenocarcinoma in the body of the uterus. The carcinoma implanted itself on the vagina from the uterus above. The disease sometimes spreads down over the vagina merely as a little reddening that one might think was due to rubbing and cleaning up. I recall one case in which I found a heap of epithelium extending by direct continuity down over the cervix, there being a sharp limitation where the normal vaginal tissue began. Particular attention should be given to the little erosions on the vagina. Cancer in its most advanced stages of four or five years' duration, attended by hemorrhages, may still remain a local disease without any tendency to form metastases. Such being the case, when the disease extends out from the cervix by direct continuity of tissue, several important consequences follow. We know that we all get many cases entirely too late for anything like a radical operation. I firmly believe, and have believed for years, that every woman who has borne a child ought to be carefully examined at short intervals by the physician who attended her in childbirth, and at intervals after that; and that every woman in the United States who has borne children and who has not been examined with this particular object in view ought to be examined by a competent physician or surgeon. If that were the case we would find to-morrow thousands of cases of carcinoma in the early stages—cases which are going to come to us in a few months or next year, which will then be too far advanced for operation. Of course, it is disagreeable for women to submit to these examinations; but for the sake of the thousands of lives which would undoubtedly be saved they might be persuaded to do so. Catching these cases at an early stage, if we are in doubt as to whether it is carcinoma or not, it is an easy matter to cut out a small wedge-shaped piece of the cervix under cocaine anæsthesia, and

send it to a good microscopist or a competent pathologist to determine its benign or malignant nature.

We should try to make an early diagnosis and insist in all cases upon knowing about atypical hemorrhages, whether from the body of the uterus or from the cervix, and in order that an accurate diagnosis can be made the uterus should be curetted, if necessary, and the scrapings thoroughly examined.

Although I am not able to quote figures upon the subject, I believe carcinoma of the uterus to be as frequent in the negress as in the white woman.

If the disease extends by continuity from the uterus, give it a wide berth, whether the operation be done by the vagina or through the abdomen. Introduce catheters into the ureters. Any surgeon can catheterize the ureters if he takes a little pains to learn how to do it. If the ureters stand out as cords, you need not touch them; you can push them aside; you can leave wings of connective tissue about them, and you will have the satisfaction of having enucleated the disease. In the most severe cases there is usually distressing pain, cachexia, and fever due to the existence of a pyometra above the carcinoma. The carcinomatous area may be largely confined to the cervix, and by boring into the pyometra, letting out the pus, and preventing its reaccumulation, you will give the patient great relief. This point has not been sufficiently emphasized in the past.

Dr. J. Wesley Bovée, of Washington, D. C.—I would like to say that my experience in the radical treatment of cancer of the uterus has been, perhaps, more satisfactory than that I have been hearing to-day. I have a good many cases of over three years' standing with no recurrence of the disease after hysterectomy. I first did vaginal hysterectomy, and did it quite thoroughly, but have decided to do abdominal hysterectomy in the future. I have done three operations after the manner described by Dr. Werder, in the *American Journal of Obstetrics* of last winter, and I am much pleased in each case that I had adopted the abdominal rather than the vaginal method, because I believe we can do a more radical operation and remove more structures in the pelvis. In one of those cases I found that the lower two inches of the ureter was embedded in a mass of inflammatory or carcinomatous tissue, and above this mass it was considerably

dilated. I removed the portion of the ureter which was embedded and made an anastomosis with the bladder, which, however, was not perfectly secure, and about eight months later, there being no recurrence of the disease, I did another anastomosis with the bladder, which was successful, and I was much pleased with the second operation to find that there were no enlarged glands or any evidence that the uterus had ever had any cancer. This was eight months after operation. All three of those women are doing well thus far, without a recurrence of the disease. I have great hopes for the future treatment of uterine cancer in early cases by complete hysterectomy and by the abdominal route.

Dr. William L. Robinson, of Danville, Va.—I have only a few words to say with reference to operating for the removal of the uterus for cancer. I cannot believe that when the parts have become infected beyond the uterus that any dissection, however extensive, will ever remove the cause. When the disease has spread beyond the uterus, I believe it is beyond the power of any surgeon to eradicate it; therefore, unless we can operate early I would not advise the removal of the womb.

With reference to ameliorating the condition of the uterus in advanced cases, I wish to mention a method which I devised some four years ago. You are all aware of the amount of pain outside of the condition that Dr. Kelly has described; I allude to tension of the parts, etc. I have had five cases now in which I have opened suprapubically, ligated the ovarian arteries, severed the broad ligament and the round ligament, ligated the uterine arteries, severed the sacro-uterine ligament, let the uterus down, thoroughly cauterized and destroyed all diseased tissues per vagina, and afterward used injections of borated alcohol. One of these cases lived twelve months, another two years, and two now under observation have been without any suffering for thirteen months.

Dr. McMurtry (closing the discussion).—I am very glad that Dr. Rodman brought out the point that he did with reference to the question concerning which he has made a very extensive investigation, not only as to cancer of the uterus, but a very large range of diseases, and he has gathered together a lot of knowledge that has hitherto not been placed before the profession in suitable form, and which will be of great value to us in

the study of disease. He has investigated the influences of racial conditions upon the prevalence of disease.

My paper is based entirely upon my own experience in working in a large dispensary clinic constantly, and to a very considerable extent on my hospital service for several months in the year, as well as my private work. I have seen very few cases of cancer in the negress. While the disease is not unknown in the negress, the cases have been few. I believe I could count them on the fingers of my two hands, and I live in a country where there is an extensive negro population.

I am glad my paper has been the means of bringing out the knowledge that has been presented here this afternoon.

I cannot indorse the rosy view that Dr. Kelly takes as to ultimate results of the operative treatment of cancer of the uterus. I know that his work in this direction has been extensive and good; that his reports are sincere and reliable. But there are a great many men working in the same line who have done thorough, faithful, skilful work in the radical treatment of cancer of the uterus who do not so express themselves, and it is to be hoped that Dr. Kelly's views regarding cancer of the uterus and its operative treatment will be confirmed. His views, however, do not coincide with my own.

In my paper I particularly alluded to the condition of pyometra, as referred to by Dr. Kelly, which is one of the most painful conditions and one of the most frequent bases for septic infection and the retention of purulent secretions inside of the uterus by the damming up of the entrance. The use of the curette in these cases, with drainage and thorough cleanliness, will be found of great value.

IN MEMORIAM.

BEDFORD BROWN, M.D.

By I. S. Stone, M.D.,
Washington, D. C.

Bedford Brown was born in Caswell County, North Carolina, January 1, 1823, and died September 13, 1897, in Alexandria, Virginia. His father was also named Bedford, and was born in 1797, and was prominent in the social and political affairs of the North State for many years. He was United States Senator for two terms, and was a lawyer of prominence and decided ability.

He married Mary Lumkin Glenn, the mother of the subject of this sketch, in 1818. Mr. Brown's ancestors came from Bedfordshire, England, prior to 1700, and his wife's family from Scotland, both settling in Virginia at first. One of the Glenns was at one time Lord Provost of Glasgow.

Dr. Bedford Brown was educated in North Carolina and studied medicine with the eminent Dr. Benjamin W. Dudley, graduating from Transylvania University, Lexington, Ky., in 1848, and from Jefferson Medical College, Philadelphia, in 1853. He commenced the study of medicine at the age of twenty-one, and remained with Dr. Dudley for four years before entering the medical school. After practising medicine one year in Virginia he established himself in his native town of Caswell, North Carolina, where he remained until 1861, when he was commissioned a full surgeon in the Confederate Army, under General John B. Floyd. He finished the cam-

paign of 1861 under General R. E. Lee. January, 1862, made surgeon of camp of instruction, Raleigh, N. C. May, 1862, returned to field duty as surgeon of the Forty-third North Carolina Regiment. Was then made brigade surgeon of Daniel's brigade, and participated in all the campaigns of Virginia until January, 1863, when he was made medical director on the staff of General Gustavus W. Smith, serving until the resignation of that officer, when he became inspector of hospitals and camps for the remainder of the war, when he returned to practise in his native State, but removed in 1865 to Alexandria, Virginia.

In 1852 he was married to Mary Elizabeth Simpson, of Montgomery County, Maryland, who was a granddaughter of Peter Lenox, of Williamsburg, one of the early residents of that famous town, and who settled in Washington City in 1792. To them was born a family of ten children, of whom seven died in infancy. One of them, Dr. William Bedford Brown, is now practising a specialty in New York, and another, Mr. Glenn Brown, is a well-known architect of Washington, D. C.

Dr. Brown was a liberal contributor to the medical literature of his day, but we think his mind and pen must have been more actively engaged during his later years. In some years he would produce a great many valuable articles for the medical press. He was in no sense a mere attendant upon the meetings of the medical societies to which he belonged, but entered with zeal and spirit into the discussion of almost every variety of medical topic. He was the best type of a general practitioner, and was quite as familiar with surgical as with medical topics. He was always in favor of higher medical education, and was a member of the Medical Examining Board from its origin until the time of his death. So far as this Society is concerned, he was not only one of its founders, but he seemed to cherish it most dearly, and I believe gave it first place next his heart. He loved to attend its sessions, and was its President in 1893. He never sought or even thought of seeking office, but his eye would

moisten and his face become a study for an artist when he realized how much he was beloved by his fellows, who thus gave evidence of their appreciation. Of his valuable papers it may be said they are too numerous for recital, although many deserve special mention. They show how remarkably he utilized his varied experience and crystallized it into the concrete result he handed forth so generously to others. His "Observations on the Action of Chloroform on the Functions of the Brain" and his methods of resuscitating newborn infants by hypodermatic medication are justly entitled to the distinction "classical." His paper on Dr. Dudley, his famous preceptor, shows the author's character and mental qualities, quite as well as it sets forth his master's fame.

PARTIAL LIST OF ARTICLES.

Treatment of Hydrocele, 1855;

Typhoid Pneumonia, 1858;

State of the Nutritive Functions during Continued Fever, 1859;

Treatment of Malignant Forms of Remittent Fever with Nitric Acid, 1859;

A Case of Extensive Compound Fracture of the Cranium, Severe Laceration, and Destruction of a Portion of the Brain, followed by Fungus Cerebri and Terminating in Recovery, 1860.

AFTER THE CIVIL WAR.

Epidemic of Diphtheria;

Internal Use of the Tincture of the Chloride of Iron in Cutaneous Affections;

The Use of Bromide of Potassium in Affections of the Testis;

Contributions to the Pathology of Adherent Placenta;

Treatment of Membranous Croup by means of Large Doses of Iodide of Potassium;

Pathology and Treatment of Injury from Burns;

Treatment of Infantile Pneumonia;

Treatment of Puerperal Convulsions;

Treatment of Lacerations of the Cervix Uteri without Surgical Operation;

Personal Experience in the Treatment of One Thousand Cases of Pneumonia;

Medical Treatment of Fibroid Tumors of the Uterus;

Systematic Infection, Gonorrhœal Poisoning;

The Simple, Septic, Traumatic, and Specific Forms of Cervicitis;

Personal Recollections of Dr. Benjamin W. Dudley, and his Surgical Methods;

The Antisepte Treatment of Infantile Enterocolitis;

Septic Dysentery and Its Treatment;

Practical Treatment of Accidental Abortion;

Sanitation in Confederate States Army.

SOCIETIES.

Member of the Virginia Medical Examining Board from its organization until his death;

Member of the Pan-American Medical Congress;

Past President of the Southern Surgical and Gynecological Society;

Vice-President American Medical Association;

Past President Virginia Medical Society;

Honorary Member of the Medical Society of the District of Columbia.

CORNELIUS KOLLOCK, M. D.

CORNELIUS KOLLOCK.

The following sketch of the life of Dr. Kollock, an ex-President of this Association, by Dr. Richard B. Maury, appeared in volume xxiii. of the *Transactions of the American Gynecological Society:*

Since the last meeting of this Society death has robbed us of one of our most respected Fellows, Cornelius Kollock.

Dr. Kollock was born near Cheraw, South Carolina, in 1824.

His literary education was received at Brown University, Rhode Island, where he graduated in the year 1845.

His medical studies were pursued at the University of Pennsylvania, and he took the degree of M.D. in that school in 1848.

After this he went to Paris, and studied there for two years under the teachings of Malgaigne, Velpeau, Ricord, Sichel, and Cazeaux.

It may be a matter of wonder that such a man, with such attainments as he possessed, should be content to make his home for life in an obscure village in a thinly populated section of South Carolina.

Not so surprising, then, however, as it would be now, considering the changes which have occurred in the practice of medicine and the advance in American civilization during the fifty years which have since elapsed.

Dr. Kollock commenced the practice of medicine in Cheraw in 1851, and in this little country village, whose population even now is only 976 souls, and where there are at this time but five physicians, he spent his whole professional life, and died August 16, 1897.

But his influence was exerted far beyond the narrow confines of Cheraw. His practice extended over several counties in his own State and the adjoining State of North Carolina.

For twenty years before his death he devoted his attention largely to gynecology and abdominal surgery. He was looked up to as an authority in these branches, and was regarded as a surgeon of marked ability and judgment.

For many years he was President of the Pee Dee Medical Society, and was President of the South Carolina Medical Association in 1887.

The *Transactions* of this society and those of the Southern Surgical and Gynecological Society, of which he was a member, show the deep interest he took in professional subjects, even at the advanced age of seventy years; and they also attest his wide range of practical knowledge and his familiarity with burning questions of the day.

He was great as a skilful physician and surgeon, and the history of his life in Cheraw shows that he was great as a man. There seems to have been no measure suggested for the general good of the community in which he lived with which he was not identified. He was an upright, exemplary citizen and a devoted Christian. His influence for good will be long felt in his town and parish.

He was a man of unflinching integrity and courage, always ready to assume responsibility for his every act. Thus his long life was spent in Cheraw. He was the highest type of the all-round country doctor, equipped as he was for almost every emergency in medicine and surgery. He was recognized as the friend of his fellow-men.

His life was well spent, and he left a monument more enduring than brass, in a reputation for integrity, charity, and professional skill. We can all comprehend what this means, but few of us can fill such a measure.

At the time of his burial all business was suspended, and every citizen in Cheraw went to pay a last tribute to the memory of the good and great physician.

Cornelius Kollock was one of those men of whom it may be justly said the world was better for his having lived in it.

"In the night-time or the day-time he would rally brave and well,
Though the summer lark was piping or the frozen lances fell;
Knowing if he won the battle, they would praise their Maker's name,
Knowing if he lost the battle, then the doctor was to blame.
'Twas the brave old virtuous doctor,
'Twas the good old faulty doctor,
'Twas the faithful country doctor, fighting stoutly all the same."

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